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FROM THE  
UNITED STATES GOVERNMENT









**EIGHTH ANNUAL REPORT**

**OF THE**

U.S.

**RECLAMATION SERVICE**

**1908-1909**

**F. H. NEWELL, DIRECTOR**



**WASHINGTON**  
**GOVERNMENT PRINTING OFFICE**  
**1910**



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**From the  
U. S. Government.**

## LETTERS OF TRANSMITTAL.

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DEPARTMENT OF THE INTERIOR,  
*Washington, December 6, 1909.*

SIR: In accordance with the provisions of section 2 of act of Congress approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," I have the honor to transmit herewith report containing the information specified in said act.

Very respectfully,

R. A. BALLINGER,  
*Secretary.*

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

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DEPARTMENT OF THE INTERIOR,  
UNITED STATES RECLAMATION SERVICE,  
*Washington, D. C., September 15, 1909.*

SIR: Transmitted herewith is the eighth annual report of the Reclamation Service. This report relates, in particular, to work completed and in progress during the fiscal year ended June 30, 1909, but contains, in addition, information in regard to other operations in order that the methods, progress, and results of reclamation work may be more readily understood.

Very respectfully,

MORRIS BIEN,  
*Acting Director.*

The SECRETARY OF THE INTERIOR.



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# EIGHTH ANNUAL REPORT

## OF THE

# RECLAMATION SERVICE

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F. H. NEWELL, *Director*

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### GENERAL DISCUSSION

#### LEGISLATION

#### GENERAL STATEMENT

The reclamation act and acts of Congress affecting the operations thereunder have been printed in the fifth, sixth, and seventh annual reports. For convenience of reference the reclamation act is here reprinted together with laws affecting operations thereunder that have not heretofore been printed in the annual reports.

#### RECLAMATION ACT

**AN ACT** Appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June thirtieth, nineteen hundred and one, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the five per centum of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the "reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semiarid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act: *Provided,* That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the Act of August thirtieth, eighteen hundred and ninety, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts, established under the provisions of an act of Congress approved July second, eighteen hundred and sixty-two," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from any moneys in the Treasury not otherwise appropriated.

**SEC. 2.** That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irriga-

tion works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project; also the cost of works in process of construction, as well as of those which have been completed.

SEC. 3. That the Secretary of the Interior shall, before giving the public notice provided for in section four of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act, and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works: *Provided*, That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof, and of the necessary maps, plans, and estimates of cost, the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined to be impracticable or unadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than forty nor more than one hundred and sixty acres, and shall be subject to the limitations, charges, terms, and conditions herein provided: *Provided*, That the commutation provisions of the homestead laws shall not apply to entries made under this act.

SEC. 4. That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project, and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon the lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding ten, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably: *Provided*, That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon.

SEC. 5. That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the Government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract exceeding one hundred and sixty acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act.

SEC. 6. That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided*, That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided*, That the title to and the management and operation of the reservoirs and the works

necessary for their protection and operation shall remain in the Government until otherwise provided by Congress.

SEC. 7. That where in carrying out the provisions of this act it becomes necessary to acquire any rights or property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney-General of the United States upon every application of the Secretary of the Interior, under this act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice.

SEC. 8. That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

SEC. 9. That it is hereby declared to be the duty of the Secretary of the Interior in carrying out the provisions of this act, so far as the same may be practicable and subject to the existence of feasible irrigation projects, to expend the major portion of the funds arising from the sale of public lands within each State and Territory, hereinafter named for the benefit of arid and semiarid lands within the limits of such State or Territory: *Provided*, That the Secretary may temporarily use such portion of said funds for the benefit of arid or semiarid lands in any particular State or Territory hereinafter named as he may deem advisable, but when so used the excess shall be restored to the fund as soon as practicable, to the end that ultimately, and in any event, within each ten-year period after the passage of this act, the expenditures for the benefit of the said States and Territories shall be equalized according to the proportions and subject to the conditions as to practicability and feasibility aforesaid.

SEC. 10. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect (32 Stat. L., 388).

Approved, June 17, 1902.

### PURCHASES OF BOOKS

By an act of Congress approved May 27, 1908 (35 Stat. L., 350), provision is made as follows:

The Secretary of the Interior may authorize the purchase of such law books, books of reference, periodicals, engineering and statistical publications as are needed in carrying out the surveys and examinations authorized by the act of June seventeenth, nineteen hundred and two, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories for the construction of irrigation works for the reclamation of arid lands."

### ESTABLISHMENT OF RESIDENCE, HUNTLEY PROJECT

An act of Congress approved March 16, 1908 (35 Stat. L., 44), provides for the extension of time for the establishment of residence by homestead entrymen on the Huntley project, Montana, as follows:

That the homestead entrymen on lands within the limits of the Huntley irrigation project, in the county of Yellowstone, in the State of Montana, opened to entry July twenty-second, nineteen hundred and seven, be, and they are hereby, granted an extension of time in which to establish their residence upon the lands so opened and filed upon until the fifteenth day of May, nineteen hundred and eight: *Provided*, however, that this act shall in no manner affect the regularity or validity of such filings, or any of them, so made by the said entrymen on the lands aforesaid; and it is only intended hereby to extend the time for the establishment of such residence as herein provided.



**DECISIONS OF THE SECRETARY OF THE INTERIOR****GENERAL STATEMENT**

Below is given, under suitable headings, a digest of decisions that have been rendered by the Secretary of the Interior and of some decisions rendered by the Comptroller of the Treasury during the past year relating to operations under the reclamation act.

**WATER RIGHTS**

A corporation otherwise competent is entitled to acquire a water right under the reclamation act. (February 2, 1909; 37 L. D., 428.)

No power exists in the Secretary to formally grant specific extension of time for payment of overdue water-right charges. (Assistant Attorney General, April 19, 1909; approved by the Secretary, April 22, 1909.)

Agencies of the state government are entitled to become takers of water under a reclamation project upon equitable contribution to cost of the project for the lands benefited. (Secretary, May 12, 1909.)

A contestant as such has no right or claim to the land involved as against a reclamation withdrawal and can not be recognized as entitled to apply for and be granted a water right for such land. (Secretary, February 1, 1909.)

Where entries and water-right applications have been held for cancellation for failure to pay the building charges, pending final action water may be furnished for the land upon proffer of the portion of the instalments for operation and maintenance. (Secretary, February 9, 1909.)

**ENTRIES AND FILINGS**

One who has made entry upon the public domain for less than 160 acres is disqualified from making an additional entry for a farm unit within a reclamation project, the farm unit being equivalent to a homestead of 160 acres of land outside of the reclamation project. The same reasoning applies to the reverse of the proposition, viz, that one who has made entry of a farm unit can not make additional entry for other land whether on a project or the public domain. (Secretary, June 16, 1909.)

**RIGHT OF WAY**

An easement for a reservoir granted under the act of March 3, 1891, and subsequently acquired by the United States for use in connection with a project under the reclamation act does not become extinguished by merger in the estate of the Government in the land, and entries allowed for such lands within and below the flowage contour line of the reservoir are subject to the right of flowage by storage of waters in the reservoir. (July 7, 1908; 37 L. D., 6.)

**STATE AUTHORITY**

An irrigation system held in private ownership acquired by the Government under the reclamation act is taken free from any obligation or control of state authority theretofore existing. (July 7, 1908; 37 L. D., 6.)

### WITHDRAWALS

Reclamation withdrawals within the national forests are dominant, but until needed by the Reclamation Service will remain for administrative and protection purposes under control and direction of Forest Service. (Secretary, February 27, 1909.)

### RECLAMATION

The requirement as to reclamation imposed upon lands under homestead entries shall likewise be imposed upon lands in private ownership for which water right is sought under the reclamation act. (Secretary, February 5, 1909.)

Section 8 of the reclamation act declares that the right to the use of water acquired thereunder shall be appurtenant to the land irrigated and that beneficial use "shall be the basis, the measure, and the limit of the right." There can be no beneficial use of water for irrigation until it is actually applied to reclamation of the land. The final and only conclusive test of reclamation is production. This does not, perhaps, necessarily mean the maturing of a crop, but certainly does mean the securing of actual growth of a crop. (Secretary, February 5, 1909.)

### CONTRACTS

Under a contract to furnish material to the United States, delivered f. o. b. cars at a specified station subject to inspection by the Government at place of destination, conditional title vested in the United States upon such delivery to the common carrier and the Government must look to the carrier for any damage en route. (September 29, 1908; 15 Compt., 167.)

Appeals to the Secretary on the part of contractors from the decision of the director or the chief engineer will be allowed only upon the following conditions:

1. That appeals be limited to specific points definitely outlined and submitted in writing, and, so far as possible, corroborated by the records of the Reclamation Service before submission to the Department.

2. That appeals be restricted to questions involving the legal interpretation of the contract or to charges attacking the integrity of officers of the Reclamation Service, the decision of the director or the chief engineer on questions of fact (other than such as involve the integrity of officers of the service), or engineering, or technical details to be final.

3. That the Secretary may, in his discretion, allow the contractor or his attorney opportunity to be heard orally, but the points to be presented must be submitted in writing not less than ten days in advance of the hearing, which shall be had at such time and be confined to such specific points as the Secretary may determine. (Secretary, February 26, 1909.)

Where upon default of a contractor the United States takes over the work it has not the right to contract to pay retained percentages under the original contract to any other contractor or person employed to complete the work. (Compt., Aug. 6, 1908; Orman & Crook contract, Belle Fourche project.)

In the matter of granting extension of time under a contract where there is no provision in the contract that requires the causes of delay to be ascertained at any particular time, the allowance of additional time by the Secretary of the Interior on final statement of account did not prejudice any right of the Government. (Compt., February 25, 1909; contract with Nels Olson, Shoshone project.)

## LITIGATION

### ARIZONA

#### SALT RIVER PROJECT

In the suit of Hurley *v.* Abbott et al. (see page 11 of the seventh annual report), a suit for the purpose of determining individual water rights of landowners in Salt River Valley who claim by virtue of appropriation the right to use for irrigation the natural flow of Salt River, the taking of testimony has been concluded and the court announced that opinion would be rendered during the fall of 1909.

#### YUMA PROJECT

The case of the United States *v.* Irrigation Land and Improvement Company (see seventh annual report, page 11) was placed on the calendar for the October term, 1908, of the United States Supreme Court. A motion to substitute R. A. Ballinger as appellee in the case was, on May 24, 1909, denied by the court.

### COLORADO

#### UNCOMPAHGRE VALLEY PROJECT

The suit of the Denver Savings Bank to secure property mortgaged to the bank by the Taylor-Moore Construction Company, defaulting contractors for the construction of Gunnison Tunnel (see page 12 of the seventh annual report), is still pending in the United States circuit court of appeals, the case now being entitled, Guy Le Roy Stevick as receiver of the Denver Savings Bank, appellant, *v.* The United States of America, appellee. The case is set for hearing September 6, 1909.

### KANSAS

#### GARDEN CITY PROJECT

Suit was instituted February 20, 1909, in the United States district court against the United States Sugar and Land Company because the defendants in 1908 began sinking wells to a subterranean sheet of water and was proposing to pump and divert the same so as to greatly impair and diminish the amount of water possible to be obtained and controlled by the United States. To the complaint the defendants demurred and hearing will probably be had in September, 1909.

## MONTANA

## HUNTLEY PROJECT

Piper Brothers Company, defaulting contractors on schedules 1, 2, 3, 4, and 5 of the distribution system of the Huntley project, were sued by the United States in the United States district court for Colorado to recover damages for breach of their contract, and suit was also commenced against their bondsmen, Whitney Newton and George A. Newton, sureties on their bond, to recover \$12,016.05.

## NEBRASKA-WYOMING

## NORTH PLATTE PROJECT

No further legal proceedings have been had in the Leavitt suit referred to on page 12 of the seventh annual report.

Suit in the United States district court, Wyoming, for condemnation of about 2,300 acres of land belonging to the Bothwell Company was tried before commissioners and verdict rendered in July, 1909, assessing the value of land and damages at \$193,000, and the case was appealed to the United States district court by the United States. This land is needed in connection with Pathfinder Reservoir and is now flooded.

## NEVADA

## TRUCKEE-CARSON PROJECT

The hearing in the United States district court having been had in the suit of the United States *v.* Rickey Land and Cattle Company, referred to on page 12 of the seventh annual report, in which it was sought to restrain this company from utilizing the Alkali Flat reservoir site, an injunction *pendente lite* was granted June 26, 1908. The defendants filed answer August 24, 1908, as required by the court.

## NEW MEXICO

## CARLSBAD PROJECT

All testimony has been taken in the case of the United States *v.* Edward F. Judkins et al., regarding adjudication of water rights of Black River, the Government claiming, as the successor of the Pecos Irrigation Company, prior right to the use of the waters of that stream. (See page 12 of the seventh annual report.) Trial of the case was had in the Territorial court of New Mexico on November 1, 2, and 3, 1908, but decision has not been rendered.

## HONDO PROJECT

After four continuances granted on the application of the defendant in the suit of the United States *v.* Lillie C. Klasner (see page 13 of the seventh annual report) the case was brought to trial in the Territorial court of New Mexico at Alamogordo, on November 26 and 27, 1908. The defendant did not appear at the trial and the evidence developed that she had been violating the temporary injunction and was in contempt of court. The case was duly submitted after trial but decision has not been rendered.

**OREGON****KLAMATH PROJECT**

Suits were instituted in the United States district court to recover \$480 from Sophia A. Hendley and J. B. Carroll, and to recover \$1,500 from Cantrell et al.

**SOUTH DAKOTA****BELLE FOURCHE PROJECT**

Suit was authorized by the United States against Widell-Finley Company, defaulting contractors on the main supply canal, Belle Fourche project, to recover for breach of contract and damages in a sum approximating \$82,000.

In the case of *United States v. William Moses*, sheriff of Butte County, S. Dak., commenced in October, 1907, to recover possession of certain personal property taken by the Government under the Widell-Finley contract with the United States, the property was restored to the engineer in charge of the project and the case is pending in the United States district court on an agreed statement of facts.

**WASHINGTON****YAKIMA PROJECT**

The seventh annual report, on page 13, refers to the suit of *United States v. Christian Hanson* pending in the United States circuit court of appeals at San Francisco, Cal. This court handed down its opinion February 1, 1909, reversing the judgment of the circuit court for the eastern district of Washington, and granted to the plaintiff an order of ejectment. The defendant raised several questions concerning the constitutionality of the reclamation act, but the court sustained the validity of the act.

Suit in replevin was begun June 21, 1909, in the United States circuit court for the eastern district of Washington by the *United States v. Luce*, the Standard Building Company, and Ira Petty, to recover from defendants certain personal property, consisting of tools, building material, engines, dynamos, boilers, gasoline engine, etc., of the alleged value of \$10,000. The defendants Luce and the Standard Building Company defaulted on their contract for construction of the Sulphur Creek wasteway canal and structures under the Sunny-side unit of the Yakima project, and under the provisions of the contract the United States took possession of the plant to be used in completing the contract. Demurrer was filed and the case will come up in the fall.

**WYOMING****SHOSHONE PROJECT**

Because Charles Spear defaulted on his contract for the construction of the Corbett tunnel, the United States came into possession of certain personal property, a portion of which was levied upon by Felix Alston, sheriff, to satisfy certain taxes. On March 24, 1909, a

restraining order was issued by Judge Riner, of the United States circuit court, eighth circuit, requiring the sheriff to abstain from interfering with the possession by the United States of the property it held belonging to the defaulting contractor on the Corbett tunnel, and on May 10 a temporary injunction was issued on the hearing of the case.

Suit has been authorized in the case of the United States against Charles Spear, defaulting contractor on the Corbett tunnel, to recover \$188,997.81 as damages for breach of contract and to recover against Paul McCormick and Alexander C. Johnson, his bondsmen, in the sum of \$75,000, the amount of the bond.

### PURCHASES OF RIGHTS AND PROPERTY

Section 7 of the reclamation act provides that where, in carrying out the provisions of the act, it is necessary to acquire any rights or property the Secretary of the Interior may acquire them for the United States by purchase or by condemnation through judicial process.

The following is a complete list of all such completed purchases to June 30, 1909, except as heretofore reported in the annual reports:

#### *Purchases of rights and property* SALT RIVER PROJECT, ARIZONA

Vendor.	Description.	Consideration.	Date of deed.
Bartlett, Adolphus C., and wife.	Part of NW. $\frac{1}{4}$ sec. 26, T. 2 N., R. 2 E., G. and S. R. M., 2.502 acres.	\$115.00	Dec. 29, 1908
Bowman, Louise R.....	Lots 2 and 3 and SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 6, T. 3 N., R. 14 E., and SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 31, T. 4 N., R. 14 E., G. and S. R. M.	9,000.00	<sup>a</sup> Mar. 27, 1909
Bullock, Oliver C., and wife...	Part of SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 13, T. 1 N., R. 5 E., G. and S. R. M., 3 acres.	1,085.00	Nov. 25, 1908
Calfee, David W., and wife....	Part NE. $\frac{1}{4}$ sec. 28, T. 2 N., R. 2 E., G. and S. R. M.	175.00	Oct. 8, 1908
Cline, Thomas J.....	S. $\frac{1}{4}$ NW. $\frac{1}{4}$ and N. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 21, T. 5 N., R. 11 E., G. and S. R. M.	2,000.00	<sup>a</sup> Mar. 27, 1909
Dellinger, Jane G.....	NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 19, N. $\frac{1}{4}$ SW. $\frac{1}{4}$ and SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 20, T. 14 N., R. 13 E.; S. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 18, T. 4 N., R. 12 E., G. and S. R. M.	14,500.00	<sup>a</sup> Mar. 27, 1909
Giles, William A., and wife....	Part SE. $\frac{1}{4}$ sec. 24, T. 2 N., R. 2 E., G. and S. R. M., 5.14 acres.	600.00	Dec. 9, 1908
Luhrs, George H. N., and wife	N. 86.48 feet of lots 2, 4, and 6 of block 52, city of Phoenix, Ariz.	1,500.00	Dec. 31, 1908
Schrader, Emma.....	Part NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 28, T. 2 N., R. 3 E., G. and S. R. M., Maricopa County, Ariz., 0.994 acre.	340.00	Apr. 16, 1909
Tebbs, Charles H., et al.....	S. $\frac{1}{4}$ NW. $\frac{1}{4}$ , S. $\frac{1}{4}$ NE. $\frac{1}{4}$ , W. $\frac{1}{4}$ SW. $\frac{1}{4}$ , and NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 15, SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 14, NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 23, T. 4 N., R. 12 E., G. and S. R. M.	4,700.00	<sup>a</sup> Mar. 27, 1909

#### YUMA PROJECT, ARIZONA-CALIFORNIA

Burgess, William et al.....	Lot 11 and south 10 feet of lot 12, block 55 of town site of Yuma, Ariz.	\$50.00	<sup>a</sup> May 24, 1909
Dixon, James and Alice M....	SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ , N. $\frac{1}{4}$ SW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 12, T. 7 S., R. 22 W., G. and S. R. M.	2,800.00	Sept. 24, 1908
Greene Land and Cattle Co....	Rollins ditch, etc.....	13,000.00	July 23, 1908
Molina, Jose Maria et al.....	Lots 2 and 3, block 54, and part of block 50, town site of Yuma, Ariz.	200.00	<sup>a</sup> May 25, 1909
Nunnaley, Bert. L., and wife.	Part of NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 18, T. 9 S., R. 24 W., G. and S. R. M.	25.00	Dec. 22, 1908
Rose, Dudley C.....	Interest in SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ , N. $\frac{1}{4}$ SW. $\frac{1}{4}$ , and NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 12, T. 7 S., R. 22 W., G. and S. R. M., 160 acres.	1,000.00	Nov. 14, 1908

<sup>a</sup> Judgment.

## ORLAND PROJECT, CALIFORNIA

Vendor.	Description.	Consideration.	Date of deed.
Bancroft, W. G.....	Interest in S. $\frac{1}{2}$ SE. $\frac{1}{2}$ NW. $\frac{1}{2}$ SE. $\frac{1}{2}$ SW. $\frac{1}{2}$ NE. T. 18 N., R. 6 W., M. D. M.	\$500.00	Apr. 1, 1909
Bruggman, J., and wife.....	W. $\frac{1}{2}$ sec. 35, T. 18 N., R. 6 W., W. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 2; and E. $\frac{1}{2}$ (lots 1 and 8) of NE. $\frac{1}{2}$ sec. 3, T. 17 N., R. 6 W., M. D. M., 473 acres.	9,500.00	Nov. 20, 1908
Cheney, Bettie.....	E. $\frac{1}{2}$ NE. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 3, T. 17 N., R. 6 W., and E. $\frac{1}{2}$ SE. $\frac{1}{2}$ SW. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 34, T. 18 N., R. 6 W., M. D. B. and M., 25 acres.	310.00	Do.
Colusa County.....	Abandonment of county roads in secs. 23, 14, 11, 2 and 3, T. 17 N., R. 6 W., M. D. M.	2,700.00	Dec. 8, 1908
Crossett, David, and wife.....	SE. $\frac{1}{2}$ sec. 2; sec. 11; N. $\frac{1}{2}$ NE. $\frac{1}{2}$ and NW. $\frac{1}{2}$ sec. 14, T. 17 N., R. 6 W., M. D. M.	16,500.00	June 22, 1908
Fender, Johnson, and wife.....	Lot 3 and SE. $\frac{1}{2}$ NW. $\frac{1}{2}$ and SW. $\frac{1}{2}$ sec. 2, T. 17 N., R. 6 W., M. D. B. and M., except 5 acres in NW. cor. of SW. $\frac{1}{2}$ , 234 acres.	2,750.00	Nov. 20, 1908
German Savings and Loan Society.....	Parts of W. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 10, and W. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 15, T. 17 N., R. 6 W., M. D. M., about 14 acres.	140.00	Dec. 29, 1908
Gordon, R. A., and wife.....	Lots 2, 6, and 7 sec. 3, T. 17 N., R. 6 W., M. D. B. and M., 110.71 acres.	2,500.00	Oct. 26, 1908
Grace, Thomas, and Michael Wallrath.....	NE. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 3 and NW. $\frac{1}{2}$ SW. $\frac{1}{2}$ and SW. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 2, T. 17 N., R. 6 W., M. D. M., 10 acres.	4,000.00	Nov. 20, 1908
Harbison, A. K.....	Lots 1, 8, 9, 16, sec. 34, T. 18 N., R. 6 W., M. D. M.	1,000.00	
Indian Valley Cemetery Association (trustees of).....	Parts of SW. $\frac{1}{2}$ NW. $\frac{1}{2}$ and NW. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 2, T. 17 N., R. 6 W., M. D. M., 2 acres.	850.00	Dec. 8, 1908
Marshall, Mary E., and Jane M. Paxton.....	Part of SW. $\frac{1}{2}$ NW. $\frac{1}{2}$ and W. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 24, T. 17 N., R. 6 W., M. D. M., 40.79 acres.	1,200.00	Dec. 7, 1908
Morrissey, W. H., and wife.....	Part N. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 1, T. 22 N., R. 3 W., M. D. M., 10 acres.	375.00	June 12, 1908
Rodgers, Elizabeth A.....	Fractional E. $\frac{1}{2}$ SW. $\frac{1}{2}$ and fractional NW. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 3, E. $\frac{1}{2}$ NW. $\frac{1}{2}$ S. $\frac{1}{2}$ NE. $\frac{1}{2}$ E. $\frac{1}{2}$ SW. $\frac{1}{2}$ and SE. $\frac{1}{2}$ sec. 10, E. $\frac{1}{2}$ and that part of W. $\frac{1}{2}$ sec. 15 lying east of Little Stony Creek and the Julius Weyand tract, and NW. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 22, T. 17 N., R. 6 W., M. D. M., 1,125.1 acres.	9,000.00	Aug. 7, 1908
Rohrback, D. H.....	S. $\frac{1}{2}$ NE. $\frac{1}{2}$ and SE. $\frac{1}{2}$ sec. 14; N. $\frac{1}{2}$ NE. $\frac{1}{2}$ SE. $\frac{1}{2}$ NE. $\frac{1}{2}$ and E. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 23, T. 17 N., R. 6 W., M. D. B. and M., 440 acres.	13,000.00	Oct. 26, 1908
Smith, Eliza K.....	Part of S. $\frac{1}{2}$ N. $\frac{1}{2}$ sec. 20, T. 39 S., R. 11 $\frac{1}{2}$ E., W. M., 5.61 acres.	84.15	Aug. 6, 1908
Stafford, A. A.....	S. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 14, NW. $\frac{1}{2}$ sec. 23, NE. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 22, all in T. 17 N., R. 6 W., M. D. B. and M., 160 acres.	700.00	Apr. 3, 1909
Stony Creek Irrigation Co. Weast, John H., and Chas. D. Coleman and wife.....	Stony Creek Irrigation Co. canal, etc. Lots 9, 15, and 16 and part of lot 9 sec. 3, and N. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 10, T. 17 N., R. 6 W., M. D. M., 226.65 acres.	25,000.00 9,000.00	May 21, 1909 Sept. 17, 1908

## UNCOMPAHGRE VALLEY PROJECT, COLORADO

Alerton, Henry.....	Water right, consisting of 10 statutory inches in the Montrose and Delta canal and appurtenant to the NW. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 7, T. 48 N., R. 9 W., N. M. P. M.	\$208.33	Oct. 10, 1908
Bell, John C., et al.....	Water right, consisting of 25 statutory inches of water in the Montrose and Delta canal appurtenant to the W. $\frac{1}{2}$ lots 3 and 4, sec. 19, T. 49 N., R. 9 W., N. M. P. M.	400.00	Sept. 29, 1908
Blessing, A. N.....	Water right in Montrose and Delta canal, consisting of 50 statutory inches of water in Montrose and Delta canal, and appurtenant to lots 7, 8, 9, and 10, sec. 1, T. 48 N., R. 10 W., N. M. P. M.	1,000.00	Oct. 3, 1908
Bonney, Laura K.....	Water right, consisting of 25 statutory inches of water in the Montrose and Delta canal appurtenant to the SW. $\frac{1}{2}$ sec. 26, T. 49 N., R. 10 W., N. M. P. M.	400.00	Do.
Butterfield, Rolla.....	Water right, consisting of 100 statutory inches of water appurtenant to the NE. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 35, S. $\frac{1}{2}$ NW. $\frac{1}{2}$ N. $\frac{1}{2}$ SW. $\frac{1}{2}$ SW. $\frac{1}{2}$ NE. $\frac{1}{2}$ and NW. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 36, T. 49 N., R. 10 W., N. M. P. M.	2,000.00	Jan. 12, 1909

\* Action by board of county supervisors.

## UNCOMPAHGRE VALLEY PROJECT, COLORADO—Continued

Vendor.	Description.	Consideration.	Date of deed.
Fleischhut, Ida C.....	Water right, consisting of 25 statutory inches of water in the Montrose and Delta canal appurtenant to SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 23, T. 15 S., R. 96 W., 6th P. M.	\$400.00	May 24, 1909
Galloway, A. W.....	Water right, consisting of 25 statutory inches of water in the Montrose and Delta canal appurtenant to the SW. $\frac{1}{4}$ sec. 31, T. 49 N., R. 9 W., N. M. P. M.	500.00	Dec. 30, 1908
Heath, J. T., and wife.....	Water right, consisting of 6 $\frac{1}{2}$ statutory inches in the Montrose and Delta canal appurtenant to the SW. $\frac{1}{4}$ sec. 31, T. 49 N., R. 9 W., N. M. P. M.	125.00	Jan. 12, 1909
Heath, L. C., and wife.....	Water right, consisting of 18 $\frac{1}{2}$ statutory inches of water in the Montrose and Delta canal appurtenant to the SW. $\frac{1}{4}$ sec. 31, T. 49 N., R. 9 W., N. M. P. M.	375.00	Jan. 16, 1909
Loutsenhizer Canal Co.....	The Loutsenhizer canal system.....	15,000.00	Sept. 25, 1908
Parsons, H. R.....	Water right, consisting of one-half cubic foot of water per second of time in the Montrose and Delta canal and appurtenant to the S. $\frac{1}{4}$ NE. $\frac{1}{4}$ and W. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 22, T. 49 N., R. 10 W., N. M. P. M.	400.00	Oct. 6, 1908
Simmons, Pauline.....	Water right in Montrose and Delta canal, consisting of one-half cubic foot of water per second of time appurtenant to N. $\frac{1}{4}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ and N. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 14, T. 49 N., R. 9 W., N. M. P. M.	400.00	Oct. 20, 1908

## PAYETTE-BOISE PROJECT, IDAHO

Brood, Nels, and wife.....	S. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 22, T. 3 N., R. 3 W., B. M., 160 acres.	\$1,800.00	Nov. 14, 1908
Burley, David E.....	SE. $\frac{1}{4}$ sec. 1, and part of NE. $\frac{1}{4}$ sec. 12, T. 2 N., R. 3 W., B. M., 296 acres.	5,920.00	June 9, 1909
Church, M. I., and wife.....	Interest in SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 36, T. 3 N., R. 3 W., B. M.	385.00	Dec. 17, 1908
Crum, Wm. A., and Edwin F.....	NW. $\frac{1}{4}$ and part SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 8, T. 2 N., R. 2 W., B. M., 198 acres.	4,000.00	Mar. 11, 1909
Dils, Marie N. S.....	S. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 34, and S. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 35, T. 3 N., R. 3 W., B. M.	3,000.00	Mar. 19, 1909
Dresser, Carrie J.....	NE. $\frac{1}{4}$ sec. 21, T. 3 N., R. 3 W., B. M.	2,750.00	Do.
Fox, F. A.....	Improvements on right of way across NW. $\frac{1}{4}$ sec. 32, T. 3 N., R. 2 W., B. M.	69.00	Sept. 15, 1908
Funk, A. S.....	SW. $\frac{1}{4}$ sec. 34, T. 3 N., R. 3 W., B. M., 160 acres.	2,890.00	Apr. 1, 1909
Green, R. E., et al.....	Part E. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 1, T. 2 N., R. 3 W.; SW. $\frac{1}{4}$ W. $\frac{1}{4}$ SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 6, T. 2 N., R. 2 W.; SW. $\frac{1}{4}$ W. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 8, T. 2 N., R. 2 W., B. M.; part NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 8, T. 2 N., R. 2 W., B. M.; SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 8, T. 2 N., R. 2 W., B. M.; part W. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 9, T. 2 N., R. 2 W., B. M.; part N. $\frac{1}{4}$ sec. 17, T. 2 N., R. 2 W., B. M.; N. $\frac{1}{4}$ sec. 7, T. 2 N., R. 2 W.; part S. $\frac{1}{4}$ sec. 7, T. 2 N., R. 2 W.; N. $\frac{1}{4}$ sec. 2, T. 2 N., R. 3 W.; part N. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 2, T. 2 N., R. 3 W.; N. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 2, T. 2 N., R. 3 W., B. M.; part SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 2, T. 2 N., R. 3 W.; NE. $\frac{1}{4}$ N. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 2 N., R. 3 W.; SE. $\frac{1}{4}$ sec. 20, T. 3 N., R. 3 W.; S. $\frac{1}{4}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 34, T. 3 N., R. 3 W.; SW. $\frac{1}{4}$ sec. 21, T. 3 N., R. 3 W., 2,624.78 acres.	52,495.60	Apr. 21, 1909
Hoobler, W. A.....	Improvements on right of way across SE. $\frac{1}{4}$ sec. 30, and NE. $\frac{1}{4}$ sec. 31, T. 3 N., R. 2 W., B. M.	240.00	Sept. 30, 1908
Idaho (State of).....	SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 36, T. 3 N., R. 3 W., B. M., 40 acres.	578.50	Dec. 29, 1908
Do.....	Interest in N. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 16, T. 2 N., R. 2 W., B. M.	1,065.00	Jan. 21, 1909
Do.....	Interest in NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 36, T. 3 N., R. 3 W., B. M.	542.50	Feb. 15, 1909
Do.....	Parts of secs. 16 and 36, T. 3 N., R. 3 W., B. M., 278 acres.	3,480.00	Feb. 24, 1909
Isham, A. F.....	Interest in NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 36, T. 3 N., R. 3 W., B. M.	360.00	Jan. 26, 1909
Jenkins, Sarah E.....	Part of S. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 27, T. 3 N., R. 3 W., B. M.	1,040.00	Dec. 24, 1908
Judd, Stoddard.....	NW. $\frac{1}{4}$ sec. 29, T. 3 N., R. 3 W., B. M., 160 acres.	2,695.00	Feb. 1, 1909
McAdoo, Marshall S., and wife.....	SW. $\frac{1}{4}$ sec. 20, T. 3 N., R. 3 W., B. M.	2,750.00	Mar. 19, 1909

a Judgment.



## PAYETTE-BOISE PROJECT, IDAHO—Continued

Vendor.	Description.	Consideration.	Date of deed.
Richards, W. H.....	One-tenth interest in N. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 16, T. 2 N., R. 2 W., B. M.	\$722.13	Dec. 31, 1908
Van Pelt, Ed. L.....	S. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 3, T. 2 N., R. 3 W., B. M.....	2,131.00	Oct. 6, 1908

## GARDEN CITY PROJECT, KANSAS

Cone, Roy S., and wife.....	Part of lot 6 in NW. $\frac{1}{4}$ sec. 13, T. 24 S., R. 35 W., 6th P. M.	\$194.75	Sept. 5, 1908
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## FLATHEAD INDIAN PROJECT, MONTANA

Felsman, Henry.....	Improvements on subagency at St. Ignatius...	\$185.00	Jan. 9, 1909
Keeler, Julia.....	Damage to improvements on sec. 8, T. 22 N., R. 20 W., M. P. M.	121.90	July 27, 1909

## MILK RIVER PROJECT, MONTANA

Blumankamp, George H.....	W. $\frac{1}{2}$ SW. $\frac{1}{4}$ , SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ and SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 23, T. 3 N., R. 26 E., M. M.	\$3,100.00	Nov. 10, 1908
Horn, Jesse.....	Rights on Fort Belknap Reservation.....	250.00	May 15, 1909
Jones, Dudley.....	Part NW. $\frac{1}{4}$ sec. 22, T. 31 N., R. 26 E., M. P. M., 87.70 acres.	1,534.75	Feb. 19, 1909
Neibaur, Isaac A.....	Part of SW. $\frac{1}{4}$ sec. 6, T. 30 N., R. 27 E., M. P. M., 50 acres.	500.00	Nov. 16, 1908
Schulz, Mrs. J. J.....	Rights on Fort Belknap Reservation.....	1,000.00	May 15, 1909
Strong.....	do.....	250.00	Do.

## SUN RIVER PROJECT, MONTANA

Laird, John.....	N. $\frac{1}{2}$ NE. $\frac{1}{4}$ , SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ , and NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 14, N. $\frac{1}{2}$ SE. $\frac{1}{4}$ and S. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 13, W. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 23, N. $\frac{1}{2}$ SE. $\frac{1}{4}$ , SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ and S. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 24, NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ and N. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 25, S. $\frac{1}{2}$ NE. $\frac{1}{4}$ , N. $\frac{1}{2}$ NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ , and SE. $\frac{1}{4}$ sec. 26, NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, T. 21 N., R. 7 W.; also SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ and S. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 18, NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ and E. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 19, E. $\frac{1}{2}$ NE. $\frac{1}{4}$ , W. $\frac{1}{2}$ SE. $\frac{1}{4}$ , and S. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 30, T. 21 N., R. 6 W., M. P. M., 1,600 acres.	\$12,000.00	Dec. 16, 1908
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## LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA

Anderson, Peter, and wife.....	Part of NW. $\frac{1}{4}$ sec. 21, T. 23 N., R. 59 E., M. P. M., 7.41 acres.	\$74.10	Dec. 10, 1908
Do.....	Part S. $\frac{1}{2}$ sec. 21, T. 23 N., R. 59 E., M. P. M., 9.28 acres.	92.80	Do.
Do.....	Part of NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 21, T. 23 N., R. 59 E., M. P. M., 0.53 acre.	5.30	Dec. 29, 1908
Benner, Anna J., and husband	Part of sec. 5, T. 22 N., R. 59 E., M. P. M., 0.81 acre.	8.10	July 11, 1908
Bosler, Joseph, Jr.....	Part of sec. 11, T. 21 N., R. 58 E., M. P. M., 5.3 acres.	53.00	Oct. 14, 1908
Bruegger, John.....	Part W. $\frac{1}{2}$ sec. 23, T. 23 N., R. 59 E., M. P. M., 12.23 acres.	122.30	Feb. 13, 1909
Frederickson, August A., and wife.....	Part of SW. $\frac{1}{4}$ sec. 20, T. 20 N., R. 58 E., M. P. M., 2.5 acres.	25.00	Dec. 15, 1908
Do.....	Part of sec. 21, T. 20 N., R. 58 E., M. P. M., 45.2 acres.	226.00	Do.
Harper, Alfred C., and wife...	Parts of E. $\frac{1}{2}$ and SE. $\frac{1}{4}$ sec. 23, T. 23 N., R. 59 E., M. P. M., 4.76 acres.	47.60	Apr. 25, 1908
Harrison, Susie.....	Part of SE. $\frac{1}{4}$ sec. 9 and part of N. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 10, T. 23 N., R. 59 E., M. P. M., 6.07 acres.	65.00	Sept. 30, 1908
Do.....	Part NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 9, and part N. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 10, T. 23 N., R. 59 E., M. P. M., 0.56 acre.	5.60	Dec. 31, 1908
Josephson, Louis, and wife....	Part of NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 15, T. 23 N., R. 59 E., M. P. M., 3 acres.	60.00	June 6, 1908

## LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA—Continued

Vendor.	Description.	Consideration.	Date of deed.
Kemmis, Orra J., and wife....	Part NW. $\frac{1}{4}$ sec. 5, T. 22 N., R. 59 E., M. P. M., 1.65 acres.	\$19.50	Aug. 13, 1908
Lindsey, Edwin J.....	Part SE. $\frac{1}{4}$ sec. 17, T. 20 N., R. 58 E., M. P. M., 2.53 acres.	25.00	Nov. 28, 1908
Do.....	Part sec. 21, T. 20 N., R. 58 E., M. P. M., 45.2 acres.	226.00	Do.
Lovering, Geo. I.....	Part NW. $\frac{1}{4}$ sec. 1, T. 21 N., R. 58 E., M. P. M., 3.5 acres.	35.00	June 20, 1908
McRay, Geo. L.....	Part E. $\frac{1}{4}$ sec. 11, T. 21 N., R. 58 E., M. P. M., 4.49 acres.	45.50	June 24, 1908
Meadors, John P., and wife....	Part SW. $\frac{1}{4}$ sec. 1, T. 21 N., R. 58 E., M. P. M., 4.5 acres.	45.00	Apr. 3, 1908
Reid, Geo. O., and wife.....	Part NW. $\frac{1}{4}$ sec. 3, T. 22 N., R. 59 E., M. P. M., 4.62 acres.	46.20	June 24, 1908
Staffenson, Ephraim, and wife	Part sec. 5, T. 22 N., R. 59 E., M. P. M., 5.66 acres.	169.80	June 6, 1908
Stewart, John A.....	Parts W. $\frac{1}{4}$ sec. 13, and of E. $\frac{1}{4}$ sec. 15, T. 21 N., R. 58 E., M. P. M., 43 acres.	392.00	Nov. 19, 1908
Stierle, Charles and wife.....	Four parcels of land in sec. 23, T. 22 N., R. 58 E., M. P. M., 35.05 acres.	330.50	Dec. 23, 1908
Temple, Ernest E.....	S. $\frac{1}{4}$ SE. $\frac{1}{4}$ and lots 5, 6, 7, and 8, sec. 35, T. 18 N., R. 56 E.; lots 1, 2, 3, 6, 7, and 9, sec. 1, T. 17 N., R. 56 E.; lot 2 on Turtle Island, and lot 6, sec. 31, T. 18 N., R. 57 E., M. P. M.; also improvements on SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ and lots 7, 8, 9, 10, in sec. 2, T. 17 N., R. 56 E., M. P. M., 478.28 acres.	4,782.80	Mar. 17, 1908
Do.....	SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ and lots 7, 8, 9, and 10, sec. 2, T. 17 N., R. 56 E., M. P. M., 154.80 acres.	1,500.00	Aug. 26, 1908
Thomas, Daniel, and wife....	Part E. $\frac{1}{4}$ sec. 5, T. 22 N., R. 59 E., M. P. M., 1.25 acres.	22.50	Dec. 21, 1908

## NORTH PLATTE PROJECT, NEBRASKA-WYOMING

Conway, Preston R.....	SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 5, SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 6, and N. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 7, T. 28 N., R. 84 W., 6th P. M.	\$2,411.50	<sup>a</sup> May 29, 1909
Fort Laramie Canal and Reservoir Co.	Rights to use of water of North Platte River...	5,000.00	<sup>b</sup> June 1, 1908

## TRUCKEE-CARSON PROJECT, NEVADA

Burton, George E., and Effie May Burton.	Part of SE. $\frac{1}{4}$ sec. 19, T. 19 N., R. 27 E., M. D. R. 69 acres.	\$1,000.00	Jan. 9, 1909
Dalton, Fred A., and wife....	Canal rights of way.....	1.00	Mar. 12, 1909
Ferguson, Elizabeth; Jonathan, Finley and Cora.	.....do.....	1.00	Jan. 24, 1907

## RIO GRANDE PROJECT, NEW MEXICO-TEXAS

Ford, Eli, and wife.....	N. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 23, T. 21S., R. 1 W., N. M. P. M.	\$1.00	Feb. 9, 1907
Hager, Wm. N., and wife.....	Parts of lots 1 and 2, sec. 30, T. 21 S., R. 1 E., and lots 1 and 2, sec. 25, T. 21 S., R. 1 W., N. M. P. M., 12.05 acres.	301.25	Dec. 24, 1908
Read, Henry B., and wife....	W. $\frac{1}{4}$ SE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 29, T. 10 S., R. 3 W., N. M. P. M., 120 acres.	600.00	Mar. 22, 1909
Roullier, August E., and wife.	Lot 6, sec. 4, NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 28, E. $\frac{1}{4}$ NE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 29, T. 10 S., R. 3 W., N. M. P. M.; SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ and E. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 19, SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 20, NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ and S. $\frac{1}{4}$ SW. $\frac{1}{4}$ , SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ , SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ , NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ , and lot 3, sec. 19, W. $\frac{1}{4}$ SW. $\frac{1}{4}$ and W. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 17, NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ , NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ , and lot 1, sec. 30, SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 18, N. $\frac{1}{4}$ NE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 19, SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ and SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 20, W. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 29, T. 11 S., R. 3 W., N. M. P. M., 1,268.14 acres.	6,290.70	July 21, 1908

<sup>a</sup> Judgment.<sup>b</sup> Assignment.

## BUFORD-TRENTON PROJECT, NORTH DAKOTA

Vendor.	Description.	Consideration.	Date of deed.
Renville, Octave.....	Damages to improvements on Indian allotment, S. $\frac{1}{2}$ SW. $\frac{1}{2}$ , N. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 13, T. 152 N., R. 104 W., 5th P. M.	\$75.00	June 25, 1909

## WILLISTON PROJECT, NORTH DAKOTA

Boltz, Rudolph.....	Part of SW. $\frac{1}{2}$ NE. $\frac{1}{2}$ and NW. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 7, T. 154 N., R. 100 W., 5th P. M., 20.5 acres.	\$115.00	Feb. 16, 1909
Dwyer, John C.....	Release of claims for damages to improvements, NE. $\frac{1}{2}$ sec. 5, T. 155 N., R. 100 W., 5th P. M.	75.00	Apr. 23, 1909
Miller, Judd.....	Lot 1, block 22, original townsite of Williston; also parts lots 2 and 3.	150.00	Feb. 28, 1908

## KLAMATH PROJECT, OREGON-CALIFORNIA

Adams, J. Frank, and wife....	Part NE. $\frac{1}{2}$ sec. 36, T. 39 S., R. 9 E., 20.96 acres..	\$1.00	June 9, 1908
Ady, Abel, and wife.....	Part sec. 23, T. 40 S., R. 8 E., W. M., 1.49 acres..	1.00	Mar. 31, 1908
Armstrong, Frank L.....	Part sec. 32, T. 38 S., R. 9 E., W. M., 0.066 acres..	500.00	July 9, 1908
Bloomingscamp, Geo.....	Part E. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 30, T. 39 S., R. 10 E., W. M.	752.25	Jan. 30, 1909
Burwell, E. B., and wife.....	Part NE. $\frac{1}{2}$ SW. $\frac{1}{2}$ and W. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 30, T. 39 S., R. 10 E., W. M., 8.48 acres.	360.40	Feb. 9, 1909
Carleton, G. H.....	Part E. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 36, T. 40 S., R. 10 E., W. M., 3.07 acres.	1.00	Mar. 8, 1909
Carroll, John D., and George Bloomingscamp.	Part sec. 30, T. 39 S., R. 10 E., W. M., 10.03 acres.	752.25	Jan. 21, 1909
Dennis, W. B.....	Part SW. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 14, T. 39 S., R. 9 E., W. M.	1.00	Jan. 30, 1909
Enterprise Land and Investment Co.	Part SW. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 34, T. 38 S., R. 9 E., W. M., and NE. $\frac{1}{2}$ sec. 9, T. 39 S., R. 9 E., W. M.	1.00	June 14, 1909
Griffith, John B., and wife....	Part lot 11 and SE. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 31, T. 39 S., R. 10 E., W. M.	1,600.00	June 18, 1909
Griffith, Tisdale E.....	Parts NE. $\frac{1}{2}$ sec. 36, T. 39 S., R. 10 E., W. M., 20.96 acres.	1.00	May 7, 1909
Hot Springs Improvement Co.	Lots 1, 2, 3, and 4 in block 1, Hot Springs Addition to Klamath Falls.	900.00	June 6, 1908
Do.....	Parts E. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 29, W. $\frac{1}{2}$ SW. $\frac{1}{2}$ and N. $\frac{1}{2}$ SE. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 28, T. 38 S., R. 9 E., W. M., 18.37 acres.	2,800.00	Sept. 26, 1908
Jacobs, L., and wife.....	Parts SW. $\frac{1}{2}$ sec. 9, T. 39 S., R. 9 E., W. M.	1.00	Do.
Kubes, A. J.....	Part SE. $\frac{1}{2}$ NW. $\frac{1}{2}$ and E. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 26, T. 39 S., R. 9 E., W. M.	1.00	Dec. 3, 1908
Matney, John H., and wife....	Part SW. $\frac{1}{2}$ and S. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 13, T. 40 S., R. 9 E., W. M., 20.94 acres.	250.00	Feb. 17, 1909
Melhase, Fred, Henrietta, and Gus.	Part E. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 33, T. 40 S., R. 10 E., W. M.	100.00	Oct. 19, 1908
Mills, Fred H., and wife.....	Part lots 1 and 12, sec. 32, T. 38 S., R. 9 E., W. M.	1,750.00	Feb. 26, 1909
Moore, R. S., et al.....	Parts lot 1 block 1 of West Linkville, Oreg.....	500.00	May 24, 1909
Morey, A. J., and wife.....	Part NE. $\frac{1}{2}$ sec. 3, T. 41 S., R. 10 E., W. M., 0.36 acre.	1,750.00	July 7, 1908
Phillips, E. S., and wife.....	Rights of way for irrigation and drainage canals, water and riparian rights in connection with W. $\frac{1}{2}$ NW. $\frac{1}{2}$ , NW. $\frac{1}{2}$ SW. $\frac{1}{2}$ and lots 2, 3, 4, 5 and 6, sec. 31, T. 39 S., R. 10 E., W. M., and for removal of water wheel.	1,400.00	Nov. 14, 1908
Smith, Elizabeth K.....	Part S. $\frac{1}{2}$ N. $\frac{1}{2}$ sec. 20, T. 39 S., R. 11 $\frac{1}{2}$ E., 10.77 acres.	84.15	Apr. 27, 1909
Smith, Walter T., and wife....	Canal right of way over SW. $\frac{1}{2}$ sec. 35, T. 39 S., R. 9 E., W. M.	1.00	Oct. 17, 1908
Stanislaus, Mother Mary.....	Part NW. $\frac{1}{2}$ sec. 16, T. 39 S., R. 9 E., 1.33 acres..	43.89	Aug. 6, 1908
Summer, S. T., and wife.....	Part of SW. $\frac{1}{2}$ sec. 11, T. 39 S., R. 9 E., W. M., 2 acres.	100.00	May 4, 1908
White, G. W., and wife.....	Lands required for tunnel right of way.....	1.00	July 20, 1908
Do.....	Part S. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 34, T. 40 S., R. 10 E., W. M., and NW. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 3, T. 41 S., R. 10 E., W. M., 11.92 acres.	655.60	Jan. 13, 1908
Wilson, W. A., and wife.....	Part N. $\frac{1}{2}$ SE. $\frac{1}{2}$ and SE. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 33, T. 40 S., R. 10 E., W. M.	200.00	Oct. 29, 1908
			May 12, 1909

## UMATILLA PROJECT, OREGON

Vendor.	Description.	Consideration.	Date of deed.
Gulliford, C. J.....	Part E. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 16, T. 3 N., R. 29 E., W. M.	\$250.00	Dec. 5, 1907
Inland Irrigation Co.....	Part NW. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 33, T. 4 N., R. 29 E., W. M., 0.49 acres.	49.00	Nov. 4, 1908
Ward, Chas. J., and wife.....	Part SE. $\frac{1}{2}$ sec. 5, T. 3 N., R. 29 E., W. M., 5.4 acres.	210.00	June 18, 1908

## BELLE FOURCHE PROJECT, SOUTH DAKOTA

Beaulieu, P. N.....	Relinquishment of H. E. 15139, SW. $\frac{1}{2}$ sec. 32, T. 9 N., R. 4 E., B. H. M.	\$225.00	Nov. 7, 1908
Dyer, Jennie.....	Part SW. $\frac{1}{2}$ sec. 23, T. 8 N., R. 5 E., B. H. M., 6.12 acres.	122.40	Oct. 30, 1908
Martin, Saml. H., and wife...	Part N. $\frac{1}{2}$ SE. $\frac{1}{2}$ and NE. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 12, T. 7 N., R. 5 E., B. H. M., 5 acres.	100.00	Oct. 29, 1908
Ross, Fred, and wife.....	S. $\frac{1}{2}$ NW. $\frac{1}{2}$ and E. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 11, T. 9 N., R. 3 E., B. H. M.	2,400.00	June 16, 1909

## STRAWBERRY VALLEY PROJECT, UTAH

Dahle, S. E., administratrix..	Part NW. $\frac{1}{2}$ NW. $\frac{1}{2}$ and SW. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 2, T. 9 S., R. 3 E., S. L. B. and M.	\$127.50	Mar. 10, 1908
Davis, W. E., jr., and wife....	Part E. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 9, and NW. $\frac{1}{2}$ SW. $\frac{1}{2}$ and S. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 10, T. 9 S., R. 4 E., S. L. B. and M.	1.00	Aug. 24, 1908
Leavitt, Chet.....	Part S. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 33, T. 8 N., R. 3 E., S. L. M., 10.09 acres.	550.00	Aug. 22, 1908

## YAKIMA PROJECT, WASHINGTON

Dean, Elza and Della.....	Lots 1 and 2 of block 34, town of Sunnyside, Wash.	\$566.00	July 15, 1909
Gains, Cora M.....	Improvements on right of way across W. $\frac{1}{2}$ SW. $\frac{1}{2}$ NW. $\frac{1}{2}$ sec. 24, T. 9 N., R. 22 E., W. M.	100.00	July 3, 1908
Hoagland, J. M.....	Improvements on right of way across SW. $\frac{1}{2}$ NE. $\frac{1}{2}$ NE. $\frac{1}{2}$ SW. $\frac{1}{2}$ SE. $\frac{1}{2}$ SW. $\frac{1}{2}$ and SW. $\frac{1}{2}$ SW. $\frac{1}{2}$ sec. 30, T. 9 N., R. 24 E., W. M.	1,500.00	June 4, 1908
Do.....	Improvements upon right of way across SW. $\frac{1}{2}$ NE. $\frac{1}{2}$ sec. 30, T. 9 N., R. 24 E., W. M.	1,000.00	Oct. 6, 1908
Marshall, A. B., and wife.....	Part of W. $\frac{1}{2}$ SW. $\frac{1}{2}$ SE. $\frac{1}{2}$ sec. 36, T. 9 N., R. 23 E., W. M.	400.00	Oct. 28, 1908
Slusecum, Martha, et vir.....	An easement on lots 5 and 7, sec. 28, T. 12 N., R. 19 E., W. M., 5.15 acres.	103.10	Mar. 3, 1909
Slusecum, Charley.....	An easement over lot 6, sec. 28, T. 12 N., R. 19 E., W. M., 5.7 acres.	85.48	Mar. 6, 1909

## TRANSPORTATION AND PURCHASES

In addition to the contracts and concessions listed in the previous annual reports the following-named transportation companies have made special concessions in freight rates from important shipping points to particular points of delivery at one or more of the various reclamation projects, resulting in a substantial benefit to the Service:

Atchison, Topeka and Santa Fe Railway Company.  
 Chicago and Eastern Illinois Railway Company.  
 Chicago, Burlington and Quincy Railroad Company.  
 Chicago, St. Paul, Minneapolis and Omaha Railway Company.  
 Oregon Railroad and Navigation Company.  
 Southern Pacific Company.  
 El Paso and Northeastern Railroad Company.  
 El Paso and Rock Island Railway Company.  
 Chicago, Lake Shore and Eastern Railway Company.

Chicago, Rock Island and Pacific Railway Company.  
 Colusa and Lake Railroad Company.  
 Chicago and Northwestern Railway Company.  
 Colorado and Wyoming Railroad Company.  
 Frisco System.  
 Gila River, Globe and Northern Railway Company.  
 Maricopa and Phoenix Railroad Company.  
 North Yakima and Valley Railway Company.  
 Oregon Short Line.  
 Union Pacific Railroad Company.  
 Phoenix and Eastern Railway Company.  
 Galveston, Harrisburg and San Antonio Railway Company.  
 Texas and New Orleans Railway Company.  
 Morgan's Louisiana and Texas Railroad and Steamship Company.  
 Southern Pacific Company's Atlantic Steamship Lines.  
 Louisiana and Western Railway Company.  
 St. Louis, Kansas City and Colorado Railroad Company.  
 St. Louis, San Francisco and Texas Railway Company.

In addition to the transportation companies listed in previous annual reports the following roads have entered into general freight contracts:

Colorado and Southern Railway Company.  
 Colorado Springs and Cripple Creek District Railway Company.  
 Fort Worth and Denver City Railway Company.  
 Wichita Valley Railway Company.  
 Trinity and Brazos Valley Railway Company.

On July 1, 1908, the outstanding liabilities for freight charges amounted to \$247,257.82. There were received during the fiscal year for administrative examination bills amounting to \$665,857.11. Bills amounting to \$859,050.46 were examined and bases for settlement thereof were arranged with the claimants, leaving outstanding June 30, 1909, unsettled bills amounting to \$54,064.47. Claims made by the transportation companies on the freight bills settled during the fiscal year amounted to \$859,050.46, and the amount found due thereon, after examination at the transportation office, was \$778,047.12. The commercial charges on these bills would have been \$1,403,970.10.

On June 30, 1909, the records of the transportation office showed the status of the expense bills covering shipments consigned to contractors to be as follows:

Expense bills on hand July 1, 1908.....	\$153,622.83
Expense bills received during the year.....	96,929.19
Expense bills on which claims were filed with railroads during the year.....	208,872.39
Freight claims made on the above expense bills against the transportation companies.....	89,163.76
Expense bills on hand during the year not subject to concessions.....	41,640.95
Expense bills on hand June 30, 1909.....	38.68

A total of 1,919 purchases of supplies for field use were made through the transportation office during the fiscal year, amounting in cost to \$651,522.57.

## CEMENT TESTS

The amount of cement for which tests were made during the fiscal year ending June 30, 1909, was 196,097 barrels, of which 163,733 barrels were accepted and 32,364 barrels were rejected. Of this amount 161,075 barrels were tested at the main laboratory (located at Chicago, Ill., until end of March, 1909, and since then at Denver, Colo.), and 35,022 barrels at the laboratory at Berkeley, Cal. The companies manufacturing this cement, and the projects for which it was furnished, are as follows: Colorado Portland Cement Company, Portland, Colo. (Ideal brand), for Minidoka, North Platte, Payette-Boise, Strawberry Valley, and Uncompahgre Valley projects; Iola Portland Cement Company, Iola, Kans. (Iola brand), and United Kansas Portland Cement Company, Iola, Kans. (Sunflower brand), for Carlsbad, Garden City, North Platte, Rio Grande, Salt River, Shoshone, and Yuma projects; Marquette Cement Manufacturing Company, Lasalle, Ill. (Marquette brand), for Shoshone project; Pacific Portland Cement Company, Tolenas, Cal. (Golden Gate brand), for Klamath, Orland, Umatilla, and Yakima projects; Standard Portland Cement Company, Napa Junction, Cal. (Standard brand), for Klamath, Orland, Payette-Boise, Umatilla, and Yakima projects; Union Portland Cement Company, Devils Slide, Utah (Red Devil brand), for Minidoka project; Universal Portland Cement Company, South Chicago, Ill. (Universal brand), for Blackfeet, Buford-Trenton, Huntley, Lower Yellowstone, Milk River, North Platte, Sun River, and Williston projects; Western Portland Cement Company, Yankton, S. Dak., for Belle Fourche project.

The methods of testing used in the laboratory conform in general to those prescribed by the standard specifications for cement of the American Society for Testing Materials.

Regular sets of long-time tests have been continued, and other miscellaneous work has consisted of sand tests for various projects; waterproofing tests; tests in connection with the investigation of the effect of alkali on cement and concrete; and collection and inspection of samples from new plants on which operations have recently started.

The accompanying tabulation gives the average results of all tests on accepted cement made by the main laboratory (tests at the Berkeley laboratory not included) from July 30, 1904, to June 30, 1909.

## Tabulation of cement tests from July 30, 1904, to June 30, 1909

[Averages of accepted cement.]

Brand.	Quantity.	Fineness.		Setting time.		Specific gravity.	Tensile strength.				
		Passing No. 100 sieve.	Passing No. 200 sieve.	Initial.	Final.		Composition of briquets.	1 day.		7 days.	
								Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.
	<i>Barrels.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>Hrs. m.</i>	<i>Hrs. m.</i>						
Cowboy.....	15,645	96.1	77.1	3 11	6 15	3.16	Neat... 3 to 1..	25	316	570	758
Ideal.....	88,233	94.9	77.3	3 22	7 13	3.13	Neat... 3 to 1..	60	408	1,864	703
Iola.....	52,703	93.5	78.4	3 47	7 45	3.16	Neat... 3 to 1..	65	367	1,864	272
Marquette.....	27,110	94.6	77.2	3 16	7 8	3.14	Neat... 3 to 1..	25	424	832	819
Red Devil.....	820	96.4	76.8	4 41	9 30	3.15	Neat... 3 to 1..	10	364	500	394
Red Diamond.....	19,711	96.1	74.8	3 57	8 22	3.15	Neat... 3 to 1..	35	329	92	729
Sunflower.....	85,330	94.3	78.2	3 32	7 23	3.16	Neat... 3 to 1..	60	369	92	285
Universal.....	182,525	97.0	81.0	3 23	7 26	3.14	Neat... 3 to 1..	65	343	1,195	649
Yankton.....	21,557	95.9	79.6	3 52	8 30	3.22	Neat... 3 to 1..	68	255	1,195	302
										1,140	815
										1,140	283
										3,610	659
										3,610	263
										770	644
										770	257
Total and average.	493,634	95.5	78.9	3 29	7 27	3.15	Neat... 3 to 1..	413	348	10,673	707
										10,673	278

Brand.	Tensile strength.											
	28 days.		3 months.		6 months.		1 year.		2 years.		3 years.	
	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.
Cowboy.....	570	878	25	887	25	890	25	816	15	821	5	830
	570	373	25	444	25	456	25	435	15	433	5	402
Ideal.....	1,864	763	60	772	60	774	50	742	40	755	30	738
	1,864	361	60	428	60	439	50	448	40	444	30	426
Iola.....	932	883	60	882	60	855	60	834	50	805	15	853
	932	428	60	459	60	465	60	435	50	415	15	451
Marquette.....	500	855	25	815	25	783	15	709	.....	.....	.....	.....
	500	404	25	432	25	442	15	433	.....	.....	.....	.....
Red Devil.....	92	836	10	808	10	846	5	729	.....	.....	.....	.....
	92	407	10	433	10	439	5	427	.....	.....	.....	.....
Red Diamond.....	1,195	717	45	738	45	761	40	790	40	793	40	724
	1,195	406	45	477	45	498	40	509	40	472	40	421
Sunflower.....	1,140	902	60	853	60	838	35	818	20	827	10	784
	1,140	427	60	448	60	445	35	424	20	373	10	333
Universal.....	3,610	804	65	864	65	821	60	811	45	800	20	772
	3,610	375	65	418	65	405	60	399	45	382	20	352
Yankton.....	770	778	40	801	40	831	30	776	20	742	5	756
	770	359	40	438	40	447	30	450	20	430	5	461
Total and average.	10,673	809	395	827	390	818	320	794	230	790	125	760
	10,673	388	395	443	390	447	320	440	230	422	125	406

**INDIAN IRRIGATION**

Under an agreement between the Office of Indian Affairs and the Reclamation Service, certain irrigation work on Indian reservations authorized by Congress and provided for in appropriations under the control of the Indian Office, is being performed by the Reclamation Service. Plans and estimates for proposed work are prepared by engineers of the Reclamation Service and transmitted to the Office of Indian Affairs for review. If the plans and estimates are concurred in by the Office of Indian Affairs and are afterwards approved and authorized by the Secretary of the Interior, the work is prosecuted by the Reclamation Service in accordance therewith, and the cost is eventually returned to the reclamation fund from the authorized Indian appropriations. Important work of the Reclamation Service on Indian irrigation projects is described under the heading "Discussion of projects," and the financial status of the work as a whole is shown by Table 20 on page 32.

**FINANCES****RECLAMATION FUND**

The act of June 17, 1902 (32 Stat. L., 388), provides that all moneys received from July 1, 1900, from the sale and disposal of public lands in certain States and Territories, and including the surplus fees and commissions in excess of allowances to registers and receivers of the land office, and excepting the 5 per cent of the proceeds of the sales of public lands set aside by law for educational and other purposes, shall be reserved, set aside, and appropriated as a special fund to be known as the reclamation fund.

Table 1 shows the accretions to the reclamation fund, by States, for the period covered by the fiscal years 1901 to 1908, inclusive, the present and probable further additions for the fiscal year 1909, and the estimated totals for the entire period covered by the fiscal years 1901 to 1909, inclusive. The amount estimated for the year 1909 is based upon the actual receipts from the sales of public lands as reported by receivers of the several land offices and the average percentage accruing to the reclamation fund, as shown by Table 2. The grand total, \$58,582,140.66, represents the entire amount that will probably have become available for expenditure prior to December 31, 1910. This table also shows the gross amount of the allotments to cover work to December 31, 1910, and the actual net investment of the United States to June 30, 1909, by States.



TABLE 1.—Receipts from the sales of public lands, allotments, and net investment, by States

State.	Actual receipts to June 30, 1908.	During fiscal year 1909.		Estimated total to June 30, 1909.	Allotments to Dec. 31, 1910.	Net investment to June 30, 1909.
		Actual.	Estimated.			
Arizona.....	\$435,925.98		\$89,500.80	\$525,426.78	\$11,398,093.73	\$9,860,806.65
California.....	3,453,779.14		433,601.55	3,887,380.69	1,900,733.05	1,224,212.74
Colorado.....	3,819,585.13		610,364.67	4,429,949.80	4,684,330.33	3,655,426.80
Idaho.....	3,493,432.49		313,514.60	3,876,607.09	7,061,345.09	4,801,793.41
Idaho, sales of town lots.....	63,735.00	\$5,925.00				
Kansas.....	452,487.05		169,174.98	621,662.03	419,000.00	357,708.92
Montana.....	3,972,643.27	466,983.02	264,364.15			
Montana, sales of town lots.....	10,664.06	4,092.85				
Nebraska.....	929,351.25		164,843.24	4,718,747.35	4,558,029.24	3,743,954.27
Nevada.....	203,374.29		77,594.16	1,094,194.49	3,562,377.01	2,827,945.24
New Mexico.....	1,649,114.36		669,863.73	2,818,978.09	4,210,346.12	3,958,311.13
North Dakota.....	8,383,144.59	805,036.36	352,076.99	9,570,257.94	1,385,145.02	1,279,124.02
Oklahoma.....	4,752,386.27		502,440.81	5,254,837.08	1,965,711.27	1,563,194.13
Oregon.....	8,174,662.33	615,215.32	278,140.47	9,068,048.12	72,215.12	67,203.52
South Dakota.....	2,565,046.66	451,307.86	496,465.32	3,502,819.84	3,146,656.07	2,430,251.33
Texas.....				40,000.00	2,670,000.00	1,918,216.50
Utah.....	769,868.62		230,060.61	999,929.23	40,000.00	24,942.49
Washington.....	5,081,284.27		461,947.10	5,543,231.37	1,082,855.50	774,353.80
Wyoming.....	2,451,024.51		429,450.80	2,889,100.31	5,241,798.20	2,851,158.06
Wyoming, sales of town lots.....			8,625.00		5,362,522.18	4,224,335.82
Secondary projects.....					172,842.07	
Townsites.....					23,000.00	
General expenses.....					300,000.00	164,980.11
Total.....	50,661,549.27	2,348,560.41	5,572,030.98	58,582,140.66	59,257,000.00	45,757,918.94

Because of the size of the work and consequent desirability of making plans far in advance it has been found necessary to make forecasts of the amount that will become available before the actual figures can be known. Table 2 shows by fiscal years the gross receipts from the sales of public lands, the amount accruing to the reclamation fund, and the percentage of the total represented by the amount added to the reclamation fund.

TABLE 2.—Total receipts from the sale of public land and resulting additions to the reclamation fund

Fiscal year.	Total receipts from reclamation States (not including townsite sales).	Additions to reclamation fund.	
		Amount (not including townsite receipts).	Per cent of total receipts.
1901.....	\$3,618,546.38	\$3,144,821.91	86.908
1902.....	5,115,619.61	4,585,520.53	89.637
1903.....	9,395,741.68	8,713,996.60	92.744
1904.....	7,605,978.29	6,826,253.59	89.748
1905.....	5,328,084.07	4,805,515.39	90.192
1906.....	5,732,554.35	5,166,336.50	90.122
1907.....	8,471,757.75	7,914,131.71	93.417
1908.....	10,235,294.28	9,430,573.98	92.137
Total.....	55,503,576.41	50,587,150.21	91.140

## ALLOTMENTS

From time to time as funds have become available and as the preliminary investigations of the several projects have shown their feasibility and practicability, the construction of such projects has been authorized and allotments therefor have been made with a view to providing the funds necessary to carry on the work. As the annual additions to the fund have usually become available about January 1 of each year, the annual allotments have been based upon the calendar year rather than upon the fiscal year. In making these allotments it has been found advisable to outline a general fiscal programme. The engineers of the service are asked to submit their plans of work and estimates of the funds necessary to carry them out. A conference is then called for consideration of these plans and estimates, and finally a programme is formulated and submitted to the Secretary of the Interior. Three such conferences have thus far been held, namely at Fallon, Nev., July 24 to 31, 1907, Mitchell, Nebr., July 27 to 31, 1908, and at Portland, Oreg., and Seattle, Wash., July 30 to August 5, 1909.

Table 3 shows the approved allotments for projects, town-site operations, and general office administration.

TABLE 3. Allotments for primary and secondary projects, town-site development and general expenses to December 31, 1910

State.	Per cent chargeable.	Project.	1902-1909.	1910.	Total, 1902-1910.
Arizona.		Salt River.....	\$7,725,000.00	\$520,000.00	\$8,245,000.00
Arizona-California.		Colorado River.....	45,000.00		45,000.00
Do.	83, 17	Yuma.....	3,600,000.00	110,000.00	3,710,000.00
California.		Orland.....	558,000.00	50,000.00	608,000.00
Colorado.		Grand Valley.....	225,000.00		225,000.00
Do.		Uncompahgre.....	4,105,000.00	350,000.00	4,455,000.00
Idaho.		Minidoka.....	3,001,250.00	454,750.00	3,456,000.00
Do.		Payette-Boise.....	3,008,000.00	455,000.00	3,463,000.00
Do.		Snake River Storage..	56,000.00	60,000.00	116,000.00
Kansas.		Garden City.....	392,000.00	27,000.00	419,000.00
Montana.		Huntley.....	915,000.00	40,000.00	955,000.00
Do.		Milk River.....	490,000.00	103,000.00	593,000.00
Do.		St. Mary.....	286,000.00	12,000.00	298,000.00
Do.		Sun River.....	590,000.00	82,000.00	672,000.00
Montana-North Dakota	70, 30	Lower Yellowstone...	2,800,000.00	110,000.00	2,910,000.00
Nebraska-Wyoming...	70, 30	North Platte.....	4,570,000.00	515,000.00	5,085,000.00
Nevada.		Truckee-Carson.....	4,111,700.00	86,300.00	4,198,000.00
New Mexico.		Carlsbad.....	687,600.00	17,400.00	705,000.00
Do.		Hondo.....	353,000.00	6,000.00	359,000.00
Do.		Leasburg.....	210,000.00		210,000.00
New Mexico-Texas...	60, 40	Rio Grande.....	75,000.00	25,000.00	100,000.00
North Dakota.		Buford-Trenton.....	329,000.00	20,000.00	349,000.00
Do.		Washburn.....	12,000.00		12,000.00
Do.		Williston.....	594,000.00	40,000.00	634,000.00
North Dakota-South Dakota.		Bowman.....	10,000.00		10,000.00
Oklahoma.		Cimarron.....	12,000.00		12,000.00
Oregon.		Central Oregon.....	45,000.00		45,000.00
Do.		Umatilla.....	1,200,000.00	25,000.00	1,225,000.00
Oregon-California.	75, 25	Klamath.....	2,116,000.00	293,000.00	2,409,000.00
South Dakota.		Belle Fourche.....	2,355,400.00	314,600.00	2,670,000.00
Utah.		Strawberry Valley...	830,000.00	200,000.00	1,030,000.00
Washington.		Okanogan.....	571,000.00	12,000.00	583,000.00
Do.		Yakima.....	3,226,000.00	1,350,000.00	4,576,000.00
Wyoming.		Shoshone.....	3,678,000.00	150,000.00	3,828,000.00
		Secondary projects.	724,000.00		724,000.00
		Town-site development.	23,000.00		23,000.00
		General expenses.....	200,000.00	100,000.00	300,000.00
Total.....			53,728,950.00	5,528,050.00	59,257,000.00

Table 4 gives the amount actually available to June 30, 1909, showing the total amount received from sales in each State and the restricted portion that must, subject to practicability, be spent in the State from which derived.

TABLE 4.—*Total and restricted funds available to June 30, 1909*

State.	Total fund.			Restricted fund (51 per cent).
	Relative order.	Per cent.	Amount.	
Arizona.....	15	0.9	\$435,925.98	\$222,322.25
California.....	8	8.8	3,453,779.14	1,761,427.36
Colorado.....	6	7.5	3,819,585.13	1,947,988.42
Idaho.....	7	7.0	3,563,082.49	1,817,177.17
Kansas.....	14	0.9	452,487.05	230,768.39
Montana.....	5	7.9	3,987,400.18	2,033,574.09
Nebraska.....	12	1.8	929,351.25	473,969.14
Nevada.....	16	0.4	203,374.29	103,720.89
New Mexico.....	11	3.3	1,649,114.36	841,048.32
North Dakota.....	1	16.6	8,383,144.59	4,275,403.74
Oklahoma.....	4	9.4	4,752,386.27	2,423,722.10
Oregon.....	2	16.1	8,174,692.33	4,169,093.09
South Dakota.....	9	5.1	2,565,046.66	1,308,173.80
Texas.....	17			
Utah.....	13	1.5	769,868.62	392,633.00
Washington.....	3	10.0	5,081,284.27	2,591,454.98
Wyoming.....	10	4.8	2,451,024.51	1,250,022.50
Unrestricted fund.....				24,829,067.88
Total.....		100.0	50,671,567.12	50,671,567.12

#### CASH TRANSACTIONS AND BALANCES

In most Governmental accounting the practice has been to limit the bookkeeping entries to completed cash transactions, and following that plan the general cash account has been used heretofore in this service as the controlling statement for all other accounts and statements. Statements of this kind appeared in the fifth and sixth annual reports. But the cash transactions alone do not show the financial condition of the Reclamation Service. The accounts of the Reclamation Service are so kept as to show other assets and liabilities. The cash account, however, must, if correct, agree with the Treasury Department's statements of funds made available by appropriation and repayment of expenditures or withdrawals. Table 5 shows a condensed statement of cash appropriated, collected, disbursed, and on hand; Table 6, a reconciliation of the amounts of the appropriations, withdrawals, and balances with the Treasury Department; and Table 7 shows balances in subtreasuries and United States depositories to the credit of special fiscal officers to June 30, 1909.

TABLE 5.—*Reclamation fund account (32 Stat. L., 388), to June 30, 1909*

Item.	Debit.	Credit.
<b>Appropriation warrant—</b>		
No. 5, October 15, 1902.....	\$3,144,821.91	
No. 16, June 3, 1903.....	4,585,520.53	
No. 13, February 1, 1904.....	8,713,996.60	
No. 6, January 5, 1905.....	6,826,253.59	
No. 10, January 22, 1906.....	4,805,515.39	
No. 11, January 3, 1907.....	5,166,336.50	
No. 12, January 25, 1907.....	60,160.00	
No. 21, April 25, 1907.....	250.00	
No. 29, June 29, 1907.....	1,125.00	
No. 8, September 30, 1907.....	9,255.35	
No. 15, December 31, 1907.....	7,914,131.71	
No. 18, December 31, 1907.....	4,233.42	
No. 30, March 31, 1908.....	1,895.36	
No. 49, June 30, 1908.....	3,343.99	
No. 5, July 31, 1908.....	1,981,891.32	
No. 11, September 30, 1908.....	615.72	
No. 17, December 31, 1908.....	7,448,682.66	
No. 19, December 31, 1908.....	1,084.36	
No. 38, March 31, 1909.....	5,271.61	
No. 51, June 30, 1909.....	3,046.16	
<b>Total.....</b>	<b>50,677,431.18</b>	
Less surplus fund warrant No. 50, June 30, 1908, to correct appropriation warrants Nos. 8 and 18.....	5,864.06	
		<b>\$50,671,567.12</b>
Disbursements, 143,198 vouchers, per Table 8.....	\$47,236,504.71	
Collections, 7,938 vouchers, per Table 9.....		1,478,585.77
Balance with Treasurer of the United States, per Table 6.....	4,005,165.41	
Balance with special fiscal agents, per Table 7.....	908,482.77	
<b>Totals.....</b>	<b>52,150,152.89</b>	<b>52,150,152.89</b>

TABLE 6.—*Balances of reclamation fund with the Treasurer of the United States, June 30, 1903, to June 30, 1909<sup>a</sup>*

Fiscal year.	Appropriations.	Withdrawals.	Balances.
1903.....	\$7,730,342.44	\$268,517.23	\$7,461,825.21
1904.....	8,713,996.60	1,611,650.19	14,564,171.62
1905.....	6,826,253.59	3,882,020.53	17,508,404.68
1906.....	4,805,608.04	7,256,926.75	15,057,085.97
1907.....	5,227,871.50	12,795,346.80	7,489,610.67
1908.....	7,926,995.77	11,126,042.02	4,290,564.42
1909.....	9,440,591.83	9,627,931.59	4,103,224.66
<b>Totals and balance per statements of the Treasury Department.....</b>	<b>50,671,659.77</b>	<b>46,568,435.11</b>	<b>4,103,224.66</b>
<b>To reconcile with accounts of the Reclamation Service:</b>			
For item in above, not in Reclamation Service accounts, deduct for C/D 901, Treasurer United States, Apr. 10, 1905, improperly carried as miscellaneous receipts, failing to reduce withdrawals, and appropriated by warrant No. 20, June 2, 1906, unduly increasing appropriation.....	92.65	92.65	.....
	50,671,567.12	46,568,342.46	4,103,224.66
<b>For items in Reclamation Service accounts, but not included in above—</b>			
Add withdrawals on direct settlements by the auditor.....	\$48,362.42		
Add withdrawals on requisitions.....	66,000.00		
	<b>\$114,362.42</b>		
Deduct repayments on deposits.....	14,812.56		
Deduct repayments on direct settlements.....	1,490.61		
	<b>16,303.17</b>		
<b>Net withdrawals.....</b>	<b>98,059.25</b>	<b>98,059.25</b>	<b>98,059.25</b>
<b>Totals and balance per reclamation accounts.....</b>	<b>50,671,567.12</b>	<b>46,666,401.71</b>	<b>4,005,165.41</b>

<sup>a</sup> The appropriations, withdrawals, and balances for the respective years shown in this table are taken from the annual "Statement of balances, appropriations, and disbursements of the Government," published by the Treasury Department for the respective fiscal years, and the amounts for the years 1903, 1904, 1905, 1906, 1907, and 1908 are found on pages 52, 42, 42, 38, 54, and 54, respectively, of the publications for those years.

TABLE 7.—*Balances with special fiscal agents on June 30, 1909*

Name.	Located at—	Amount.
Arthur, Wm. S.	Huntley, Mont.	\$8,480.32
Barnhard, C. B.	Phoenix, Ariz.	38,947.95
Barry, Vall T.	Lujane, Colo.	42,781.25
Bickel, Harry N.	St. Ignatius, Mont.	27,213.39
Brose, Fred W.	Thistle, Utah.	37,185.49
Buck, John J.	Deerfield, Kans.	35,065.67
Buck, N. K.	Sunnyside, Wash.	17,512.44
Burrows, O. P.	Mitchell, Nebr.	40,551.37
Caden, Harry.	Klamath Falls, Oreg.	1,434.06
Caldwell, H. T.	Powell, Wyo.	24,353.75
Carpenter, C. F.	Fallon, Nev.	50,000.00
Clawson, Ray R.	Boise, Idaho.	14,382.79
Costello, William F.	Naches, Wash.	14,567.94
Cundiff, Frank S.	Yuma, Ariz.	5,766.44
Dolphin, J. A.	Belle Fourche, S. Dak.	2,875.25
Donnelly, Chas. W.	St. Ignatius, Mont.	4,919.52
Duganne, C. G.	Washington, D. C.	15,752.34
Essley, Harry E.	Grand Junction, Colo.	45,723.48
Frisbee, C. E.	Family, Mont.	29,457.69
Gawler, Jos. C.	North Yakima, Wash.	59,544.93
Hamilton, Esco.	Malta, Mont.	19,957.58
Hogue, C. C.	Klamath Falls, Oreg.	33,051.73
Hough, Frank G.	Fallon, Nev.	42,963.18
Israel, Francis J.	Glendale, Mont.	38,256.86
Jensen, Niels K.	Rupert, Idaho.	13,592.86
Jones, T. E.	Belle Fourche, S. Dak.	28,266.73
Kellogg, C. W.	Hermiston, Oreg.	11,921.05
Lindeman, C. A.	Yuma, Ariz.	34,091.71
Meglasson, W. H.	Williston, N. Dak.	20,946.12
Moore, Geo. E.	Rupert, Idaho.	18,883.24
Olsen, Swan T.	Engle, N. Mex.	22,046.34
Philbaum, E. M.	Zillah, Wash.	10,000.00
Segall, Jno. L.	Phoenix, Ariz.	24,000.00
Shellenberger, A. H.	Washington, D. C.	8,279.32
Spencer, Jas. W.	Orland, Cal.	31,512.99
Ummel, J. R.	Mitchell, Nebr.	5,472.02
Yates, Herbert A.	Okanogan, Wash.	27,229.22
General Land Officer receivers.		1,505.75
Total.		908,482.77

## DISBURSEMENTS, COLLECTIONS, AND TRANSFERS

In three tables below are shown the expenditures, collections, and transfers between projects to June 30, 1909. Table 8 shows total expenditures for all operations amounting to \$47,236,504.71; Table 9 shows total collections amounting to \$1,478,585.77; and Table 10 shows the value of equipment, material, supplies, and services transferred between projects to be \$2,521,736.34.

In addition to the figures presented in these three tables, it should be mentioned that a great many collections are made that do not appear, for they are deducted from disbursement vouchers. The most important of these are the charges for meals furnished, for supplies sold through mercantile stores, for cottage rentals, and for electric power furnished contractors.

TABLE 8.—Disbursement vouchers paid to June 30, 1909

By fiscal years.		By fiscal quarters.			By calendar years.	
Year.	Amount.	Quarter ended—	Number of vouchers.	Amount.	Year.	Amount.
1903.....	\$269,094.47	Sept. 30, 1902	123	\$18,251.51	1902	\$98,981.37
		Dec. 31, 1902	587	80,729.86		
		Mar. 31, 1903	632	82,601.13		
		June 30, 1903	740	87,511.97	1903	690,174.62
		Sept. 30, 1903	1,778	217,021.46		
		Dec. 31, 1903	2,364	303,040.06		
1904.....	1,513,431.22	Mar. 31, 1904	2,029	321,625.62	1904	2,684,307.74
		June 30, 1904	2,726	671,744.08		
		Sept. 30, 1904	3,284	812,101.88		
1905.....	3,767,921.78	Dec. 31, 1904	3,878	878,836.16	1905	5,109,538.27
		Mar. 31, 1905	3,241	871,721.49		
		June 30, 1905	3,968	1,205,262.25		
		Sept. 30, 1905	5,581	1,604,912.35	1906	9,585,708.74
		Dec. 31, 1905	5,513	1,427,642.18		
1906.....	7,107,715.90	Mar. 31, 1906	4,900	1,727,511.14		
		June 30, 1906	5,969	2,347,650.23	1907	13,817,634.58
		Sept. 30, 1906	7,103	2,721,973.31		
		Dec. 31, 1906	7,815	2,788,569.06		
1907.....	12,533,916.06	Mar. 31, 1907	8,380	3,632,704.32	1908	10,228,512.55
		June 30, 1907	9,217	3,340,664.37		
		Sept. 30, 1907	9,127	3,471,601.07		
		Dec. 31, 1907	7,753	3,322,664.82	1909	5,021,646.84
1908.....	11,775,419.52	Mar. 31, 1908	6,798	2,482,944.74		
		June 30, 1908	7,170	2,498,206.89		
		Sept. 30, 1908	7,742	2,434,448.46	1909	5,021,646.84
		Dec. 31, 1908	9,016	2,812,910.46		
1909.....	10,269,005.76	Mar. 31, 1909	7,548	2,225,064.85		
		June 30, 1909	8,216	2,796,581.99		
Total.....	47,236,504.71	.....	143,198	47,236,504.71	.....	47,236,504.71

TABLE 9.—Collection vouchers collected to June 30, 1909

By fiscal years.		By fiscal quarters.			By calendar years.	
Year.	Amount.	Quarter ended—	Number of vouchers.	Amount.	Year.	Amount.
1903 <sup>a</sup> .....	\$242.37	Mar. 31, 1903	5	\$202.21	1903	\$328.66
		June 30, 1903	13	40.16		
		Sept. 30, 1903	2	74.31		
1904.....	710.84	Dec. 31, 1903	3	11.98	1904	1,371.08
		Mar. 31, 1904	10	416.78		
		June 30, 1904	107	207.77		
1905.....	1,338.85	Sept. 30, 1904	13	661.32	1905	13,032.24
		Dec. 31, 1904	27	85.21		
		Mar. 31, 1905	74	370.40		
		June 30, 1905	112	221.92	1906	42,910.08
		Sept. 30, 1905	57	6,066.77		
1906.....	22,924.63	Dec. 31, 1905	109	6,373.15		
		Mar. 31, 1906	138	8,178.25	1907	427,890.97
		June 30, 1906	60	2,306.46		
		Sept. 30, 1906	101	12,864.55		
1907.....	157,984.45	Dec. 31, 1906	124	19,560.82	1908	454,174.43
		Mar. 31, 1907	144	47,211.81		
		June 30, 1907	165	78,347.27		
		Sept. 30, 1907	310	202,160.11	1909	538,878.31
1908.....	530,966.20	Dec. 31, 1907	714	100,171.78		
		Mar. 31, 1908	698	53,262.13		
		June 30, 1908	927	175,372.18		
		Sept. 30, 1908	805	61,950.38		
1909.....	764,418.43	Dec. 31, 1908	936	163,559.74		
		Mar. 31, 1909	906	203,501.85		
		June 30, 1909	1,378	335,376.46		
Total.....	1,478,585.77	.....	7,938	1,478,585.77	.....	1,478,585.77

<sup>a</sup> Six months.

TABLE 10.—*Transfer vouchers approved to June 30, 1909*

By fiscal years.		By fiscal quarters.			By calendar years.	
Year.	Amount.	Quarter ended—	Number of vouchers.	Amount.	Year.	Amount.
1906 <sup>a</sup> .....	\$2,275.45	June 30, 1905	12	\$2,275.45	1905	\$7,704.63
		Sept. 30, 1905	5	331.30		
		Dec. 31, 1905	20	5,097.88		
1906.....	445,806.96	Mar. 31, 1906	48	11,988.55	1906	704,003.51
		June 30, 1906	227	428,389.23		
		Sept. 30, 1906	87	182,534.09		
1907.....	508,693.42	Dec. 31, 1906	126	81,091.64	1907	1,068,808.73
		Mar. 31, 1907	116	78,016.26		
		June 30, 1907	120	167,051.43		
		Sept. 30, 1907	100	84,989.10	1908	489,434.02
1908.....	1,030,342.18	Dec. 31, 1907	93	753,751.94		
		Mar. 31, 1908	53	58,222.88		
		June 30, 1908	182	128,368.26	1909	231,785.45
		Sept. 30, 1908	239	112,774.86		
1909.....	534,618.33	Dec. 31, 1908	232	190,058.02		
		Mar. 31, 1909	193	132,980.39		
		June 30, 1909	224	95,805.06		
Total.....	2,521,736.34		2,077	2,521,736.34		2,521,736.34

<sup>a</sup> Three months.<sup>b</sup> Nine months.<sup>c</sup> Six months.

### INVESTMENT IN PROJECTS

While the cash transactions alone do not fully show the financial status of the service and the several projects undertaken by it, they do show the actual amount invested in each undertaking, and represent nearly 95 per cent of the total expense incurred. For convenience the various work under way is grouped under five general heads, as follows: Primary projects, those for which definite allotments of funds are in effect and on which in most cases construction is under way or can soon be taken up; secondary projects, those for which no definite allotments of funds are in effect and on which in most cases preliminary studies and surveys are being continued to determine their feasibility and practicability; town-site operations under the acts of April 16 and June 27, 1906 (34 Stat. L., 116, 519), the expense of which is not reimbursable; Indian irrigation, projects on Indian reservations undertaken by the Office of Indian Affairs and for which repayment is made monthly by that office to the extent of the actual expense incurred; and general expense, for those expenditures that can not be directly charged to any project when first incurred, but that are subsequently transferred to projects on the basis of the benefits received. Tables 11, 12, and 13 show the total voucher transactions and net investment on each undertaking of these classes, and Table 14 gives a recapitulation of all such transactions.

TABLE 11.—Voucher transactions and net investments of the United States on primary projects to June 30, 1909

State.	Project.	Debits.		Credits.		Net Investment.	
		Disbursement vouchers.	Transfers received.	Collection vouchers.			Transfers issued.
				Miscellaneous.	Water-right charges.		
Arizona.....	Salt River.....	\$7,186,883.86	\$197,205.59	\$244,842.04	\$100,000.00	\$14,019.49	\$7,025,227.92
Arizona-California.....	Colorado River.....	35,527.37	5,153.19	760.32	.....	278.92	36,441.32
Do.....	Yuma.....	3,347,602.83	83,356.78	94,367.49	.....	3,751.64	3,322,810.48
California.....	Oriand.....	166,775.71	17,606.87	2,367.46	.....	981.80	184,003.32
Colorado.....	Grand Valley.....	46,798.69	6,280.77	20.54	.....	2,960.05	52,498.77
Do.....	Uncompahgre Valley.....	3,633,117.99	72,174.20	103,105.05	.....	3,589.44	3,598,997.70
Idaho.....	Minidoka.....	2,346,230.94	89,625.15	6,034.17	7,534.84	59,492.03	2,364,795.05
Do.....	Payette-Bolse.....	2,344,633.98	63,856.98	14,818.16	.....	19,019.53	2,374,653.27
Kansas.....	Garden City.....	353,436.23	9,859.32	1,696.05	.....	3,900.58	357,708.92
Montana.....	Hundley.....	911,601.11	26,613.51	20,911.70	.....	35,613.38	830,992.38
Do.....	Milk River.....	262,787.43	19,337.12	1,040.71	50,797.16	3,811.19	277,272.65
Do.....	St. Mary.....	258,399.12	9,798.05	7,108.09	.....	15,262.22	245,796.86
Do.....	Sun River.....	511,512.94	16,526.52	5,176.49	20,265.52	7,666.11	494,901.34
Montana-North Dakota.....	Lower Yellowstone.....	2,691,639.08	62,080.74	20,623.56	294.00	9,856.53	2,622,945.43
Nebraska-Wyoming.....	North Platte.....	3,620,215.38	949,937.07	21,157.49	4,781.47	8,401.74	4,035,811.75
Nevada.....	Truckee-Carson.....	3,871,875.21	155,056.14	19,562.02	36,900.37	24,445.95	3,945,965.01
New Mexico.....	Carlsbad.....	673,378.36	14,370.09	12,783.62	7,626.75	10,381.66	656,956.52
Do.....	Hondo.....	369,114.60	10,775.47	27,864.64	.....	541.18	341,484.35
Do.....	Leasburg.....	205,706.86	17,622.17	17,622.17	.....	5,416.63	182,124.40
New Mexico-Texas.....	Rio Grande.....	83,853.66	19,560.38	10,440.25	.....	967.47	62,366.22
North Dakota.....	Ruland-Trenton.....	287,927.01	57,238.09	439.45	423.00	93,383.69	250,989.56
Do.....	Williston.....	9,781.67	1,945.99	32.36	.....	11,001.59	501,430.67
Do.....	Williston.....	466,220.11	73,457.29	3,286.46	38.00	34,778.80	501,430.67
Do.....	Williston.....	6,220.11	1,266.70	.50	.....	47.50	6,088.40
North Dakota-South Dakota.....	Rowman.....	3,748.62	1,265.33	.....	.....	262.14	37,002.25
Oklahoma.....	Central Oregon.....	36,198.44	1,494.53	498.18	.....	269.19	37,002.25
Oregon.....	Central Oregon.....	1,097,178.47	23,777.40	12,500.05	6,464.60	31,377.68	1,071,065.54
Do.....	Unadilla.....	1,674,578.32	36,299.37	35,092.67	7,150.48	9,656.25	1,659,038.29
Oregon-California.....	Klamath.....	1,805,753.24	43,078.08	19,877.79	6,683.06	11,793.97	1,918,216.50
South Dakota.....	Belle Fourche.....	1,745,241.26	18,644.68	35,976.78	.....	6,410.89	1,731,498.30
Utah.....	Strawberry Valley.....	448,162.16	11,092.31	4,748.48	3,360.20	3,102.28	448,035.53
Washington.....	Okanogan.....	2,193,220.03	461,031.35	166,983.18	66,432.42	120,601.45	2,300,324.45
Do.....	Yakima.....	3,069,672.38	72,805.95	54,837.71	52,615.23	30,455.27	3,004,570.12
Wyoming.....	Shoshone.....	.....	.....	.....	.....	.....	.....
Total.....	Total.....	44,653,506.73	2,239,910.05	959,514.96	370,667.10	571,611.17	44,991,623.55



TABLE 12.—*Voucher transactions and net investments of the United States on secondary projects to June 30, 1909*

State.	Project.	Debits.		Credits.		Net investment.
		Disbursement vouchers.	Transfers received.	Collection vouchers.	Transfers issued.	
Arizona.....	Little Colorado.....	\$9,321.68	\$10.00	\$1.00		\$9,330.68
Do.....	San Carlos.....	24,454.87	243.74	12.90		24,685.71
Do.....	San Pedro.....	2,423.72	3.97	.35		2,427.34
California.....	Owens Valley.....	25,957.91	121.00	14,016.99		12,061.92
Do.....	Sacramento.....	46,706.45	1,214.25	45.30	\$11,335.47	36,539.93
Do.....	San Joaquin.....	3,448.92	82.48	.20		3,531.20
Colorado.....	White River.....	4,325.42	5.06	.15		4,330.33
Idaho.....	Dubois.....	21,280.79	834.98	1.81	5,068.29	17,045.67
Do.....	Port Neuf.....	2,165.77				2,165.77
Do.....	Snake River Storage.....	1,134.56	36,030.71	755.54		36,409.73
Montana.....	Clark Fork.....	5,417.71	433.67	.25	169.90	5,681.23
Do.....	Crow Reservation.....	21,029.47	5.01	1.90	1,397.24	19,635.34
Do.....	Lake Basin.....	7,044.39	79.87		13.15	7,111.11
Do.....	Madison River.....	10,657.30	2.57	1.85	67.08	10,590.94
Do.....	Marias.....	13,878.31	93.30	1.55	93.30	13,876.76
Nebraska.....	South Platte.....	1,913.96	963.05			2,877.01
Nevada.....	Walker River.....	12,344.59	1.53			12,346.12
New Mexico.....	La Plata.....	29,598.20	168.55	1,702.42		28,064.33
Do.....	Las Vegas.....	5,011.41	2.23	.30		5,013.34
Do.....	Upton Lake.....	19,101.44	5.57	125.51	914.15	18,067.35
North Dakota.....	Bismarck.....	16,709.04	26.69	14.70	3,062.09	13,658.94
Do.....	Little Missouri.....	6,313.88	457.97	1.00		6,770.85
Do.....	Nesson.....	7,460.76	29,786.35	4.14	19,801.89	17,441.08
Oklahoma.....	Red River.....	59,413.75	1,902.64	161.77	939.50	60,215.12
Oregon.....	Malheur.....	76,320.56	2,960.32	237.13	1,139.93	77,903.82
Utah.....	Bear Lake.....	18,859.06	9.20	62.06		18,806.20
Do.....	Utah Lake.....	34,044.67	9.25	4.62		34,049.30
Washington.....	Palouse.....	76,499.05	359.52	126.33	400.00	76,332.19
Do.....	Priest Rapids.....	6,218.98	247.58	.55		6,466.01
Wyoming.....	De Smet.....	9,053.32	2.51	39.55		9,016.28
Total.....		578,109.94	76,063.57	17,319.92	44,401.99	592,451.60

TABLE 13.—*Voucher transactions and net investments of the United States on town-site development, Indian irrigation, and miscellaneous to June 30, 1909*

Item.	Debits.		Credits.		Net investment.
	Disbursement vouchers.	Transfers received.	Collection vouchers, miscellaneous.	Transfers issued.	
Town-site development:					
Idaho, Minidoka project.....	\$2,196.73	\$4,527.19			\$6,723.92
Montana—					
Huntley project.....	32.20	1,071.83	\$2.00		1,102.03
Sun River project.....	111.23	920.60			1,031.83
Wyoming, Shoshone project.....	7.50		1.60		5.90
Total.....	2,347.66	6,519.62	3.60		8,863.68
Indian irrigation:					
Idaho, Fort Hall project.....	124.47	32.91			157.38
Montana—					
Blackfeet project.....	115,405.01	18,831.68	65,152.70	\$671.05	68,412.94
Flathead project.....	57,464.00	9,950.55	45,462.05	369.35	51,553.75
Fort Peck project.....	10,424.96	4,169.84	9,966.52	111.17	4,517.11
Crow project.....	8.75	6.99	10.65		5.09
Total.....	213,427.79	32,991.97	120,591.92	1,151.57	124,676.27
Miscellaneous:					
General expense.....	908,802.19	108,722.27	9,256.39	967,964.23	40,303.84
Closed accounts.....	880,310.40	57,528.86	1,231.88	936,607.38	
Total.....	1,789,112.59	166,251.13	10,488.27	1,904,571.61	40,303.84

TABLE 14.—*Recapitulation and verification of voucher transactions and all net investments of the United States paid from the reclamation fund to June 30, 1909*

Item.	Debits.		Credits.			Net investment.
	Disbursement vouchers.	Transfers received.	Collection vouchers.		Transfers issued.	
			Miscellaneous.	Water-right charges.		
Primary projects.....	\$44,653,506.73	\$2,239,910.05	\$959,514.96	\$370,667.10	\$571,611.17	\$44,991,623.55
Secondary projects.....	578,109.94	76,063.57	17,319.92	.....	44,401.99	562,451.60
Town-site development.....	2,347.66	6,519.62	3.60	.....	.....	8,863.68
Indian irrigation.....	213,427.79	32,991.97	120,591.92	.....	1,151.57	124,676.27
Miscellaneous.....	1,789,112.59	166,251.13	10,488.27	.....	1,904,571.61	40,303.84
Total.....	47,236,504.71	2,521,736.34	1,107,918.67	370,667.10	2,521,736.34	45,757,918.94

## ANALYSIS OF COLLECTIONS

All moneys collected under the operations of the Reclamation Service are authorized either by section 4 of the reclamation act (32 Stat. L., 388) or by the act of March 3, 1905 (33 Stat. L., 1032). Collections under the former are repayments of the cost, while collections under the latter are reductions of the cost of the projects.

Under the authority of these two acts there has been collected a total of \$1,478,585.77. Of this, \$20,214.98 is repayment of overpayments and is a reduction of disbursements. The balance, \$1,458,370.79, represents actual cash receipts, of which \$370,667.10 are repayments of cost and \$1,087,703.69 are reductions of cost. Those collections which operate as a repayment of cost are received from the water users in settlement of building and operation and maintenance charges under public notices issued by the Secretary of the Interior. The collections which result as reductions of the cost of projects arise from a number of sources, all of which are incidental to the work under the reclamation act. Table 15 shows the sources of cash collections, by calendar years, and Table 16 shows the amounts collected for water rights, by projects, to June 30, 1909:

TABLE 15.—*Sources of cash collections to June 30, 1909, by calendar years*

Calendar year.	Miscellaneous sales.	Miscellaneous services.	Temporary water rentals.	Transportation refunds.	Forfeitures by bidders and contractors.	Water-right building charges.	Water-right operation and maintenance charges.	Over-disbursements.	Total.
1903.....	.....	.....	.....	.....	.....	.....	.....	\$328.66	\$328.66
1904.....	.....	.....	.....	.....	.....	.....	.....	1,371.08	1,371.08
1905.....	\$2,483.55	.....	.....	\$693.88	\$9,000.00	.....	.....	854.81	13,032.24
1906.....	22,441.97	\$300.00	.....	16,492.42	.....	.....	.....	3,675.66	42,910.06
1907.....	79,650.57	13,637.27	\$128,534.23	62,943.00	.....	\$126,542.44	\$4,124.94	12,458.52	427,890.97
1908.....	96,776.40	59,232.51	188,134.29	9,668.98	1,000.00	77,984.64	20,350.33	1,027.28	454,174.43
1909 <sup>a</sup> .....	45,140.91	155,909.64	135,722.24	35,941.83	24,000.00	95,314.14	46,350.61	498.94	538,878.31
Total.....	246,493.40	229,079.42	452,390.76	125,740.11	34,000.00	299,841.22	70,825.88	20,214.98	1,478,585.77

<sup>a</sup> Six months.

TABLE 16.—Collection of water-right charges, by projects, to June 30, 1909

State.	Project.	Building charges.	Operation and maintenance charges.	Total.
Arizona.....	Salt River.....	\$100,000.00		\$100,000.00
Idaho.....	Minidoka.....	3,992.49	\$3,542.35	7,534.84
Montana.....	Huntley.....	42,110.34	5,086.82	50,797.16
Do.....	Sun River.....	17,370.45	2,895.07	20,265.52
Do.....	Lower Yellowstone.....	238.00	56.00	294.00
Nebraska-Wyoming.....	North Platte.....	3,311.82	1,469.65	4,781.47
Nevada.....	Truckee-Carson.....	23,168.90	13,731.47	36,900.37
New Mexico.....	Carlbad.....		7,626.75	7,626.75
North Dakota.....	Buford-Trenton.....	357.20	65.80	423.00
Do.....	Williston.....	38.00		38.00
Oregon.....	Umatilla.....	2,418.00	4,046.60	6,464.60
Oregon-California.....	Klamath.....	166.00	6,985.48	7,150.48
South Dakota.....	Belle Fourche.....	612.00	5,371.06	5,983.06
Washington.....	Okanogan.....	330.20	3,030.00	3,360.20
Do.....	Yakima (Sunnyside unit).....	7,745.21	3,571.61	11,316.82
Wyoming.....	Shoshone.....	55,115.60		55,115.60
		42,868.01	9,747.22	52,615.23
Total.....		299,841.22	70,825.88	370,667.10

<sup>a</sup> Collection through auditor's office for lands of Pima Indians.

<sup>b</sup> Collections by fiscal agent for lands with vested water rights.

### BALANCE SHEETS OF ASSETS AND LIABILITIES

The Reclamation Service includes in its accounts not only the cash transactions and accrued current assets and liabilities, but also the capital assets, realization upon which must under the law be deferred, and the capital liability represented by a reimbursable special fund that must ultimately be returned to the Treasury of the United States. An independent account is kept for each project, covering all current assets and liabilities, including cost of work as an asset to be realized upon in the future, and net investment of the United States as a liability to the Reclamation Service. A balance sheet is prepared for each project and the director's office monthly. For the entire service these balance sheets are combined into a consolidated balance sheet, into which are brought the assets for cash in the Treasury and with fiscal officers and the capital liability for the appropriation, reclamation fund. Table 17 is a statement of assets and liabilities at the close of accounts on June 30, 1909, made up from the consolidated balance sheet, and Tables 18, 19, and 20 are statements of assets and liabilities for the director's office, the secondary projects, and the Indian irrigation projects, respectively, on June 30, 1909. The statements of assets and liabilities for the primary projects are given in the body of this report under the project headings.

TABLE 17.—Consolidated statement of assets and liabilities for operations under reclamation fund on June 30, 1909

ASSETS		
Cash (as per Table 5):		
With Treasurer United States.....	\$4,005,165.41	
In depositories to credit of special fiscal agents.....	908,482.77	
		\$4,913,648.18
Accounts receivable:		
Uncollected freight refunds.....	12,805.86	
Uncollected water rentals.....	105,238.18	
Uncollected miscellaneous rentals.....	488.66	
Uncollected miscellaneous.....	37,621.37	
Uncollected water-right building charges.....	522,713.71	
Uncollected water-right operation and maintenance charges.....	63,462.44	
		742,330.22

<b>Inventories:</b>		
Mercantile stores.....		\$42,359.20
Government animals.....	\$186,078.96	
Less depreciation.....	37,562.54	
		148,516.42
Equipment in use.....	853,527.39	
Less depreciation.....	75,038.41	
		778,488.98
Storehouses.....		441,023.30
Cement.....		158,415.78
Iron and steel.....		29,712.69
Lumber.....		56,547.96
Explosives.....		22,134.99
Forage.....		31,574.68
Fuel.....		34,702.91
Cash in project offices.....		11,902.85
Local products.....		35,612.03
Unadjusted transfers.....		40,596.00
Freight and handling undistributed.....		106,551.49
		\$1,938,139.28
<b>Cost of work:</b>		
Building cost.....	45,968,266.65	
Less adjustments.....	94,501.91	
Less accrued revenues.....	690,605.17	
		785,107.08
		45,183,159.57
Operation and maintenance cost.....	1,216,203.26	
Less accrued revenues.....	236,966.45	
		979,246.81
<b>Total assets.....</b>		<b>53,756,524.06</b>
<b>LIABILITIES</b>		
<b>Capital:</b>		
Reclamation fund (reimbursable), as per Table 6.....	50,671,567.12	
Less expenditures on townsites (nonreimbursable), as per Table 13....	8,863.68	
		50,662,703.44
<b>Accounts payable:</b>		
Unpaid labor.....	256,143.82	
Unpaid purchases.....	354,881.10	
Unpaid contract estimates.....	575,375.36	
Unpaid contract holdbacks.....	325,542.35	
Unpaid freight and express.....	385,376.24	
Unpaid passenger fares.....	7,076.30	
Unpaid land agreements.....	30,995.91	
Unredeemed coupon books.....	2,232.97	
Unredeemed meal tickets.....	707.91	
Unpaid miscellaneous.....	16,623.32	
		1,954,955.28
<b>Repayments accrued:</b>		
Building.....	956,961.71	
Operation and maintenance.....	181,903.63	
		1,138,865.34
<b>Total liabilities.....</b>		<b>53,756,524.06</b>

TABLE 18.—Assets and liabilities on June 30, 1909, director's office

<b>ASSETS</b>		
<b>Accounts receivable:</b>		
Uncollected miscellaneous.....		\$748.98
<b>Inventories:</b>		
Equipment in use.....	\$21,094.92	
Less depreciation.....	2,026.71	
		\$19,068.21
Storehouse.....		20,777.34
Local products.....		4,453.80
Unadjusted transfers.....		345.36
Freight and handling undistributed.....		1,570.31
		46,215.02
<b>Cost of work:</b>		
Accrued revenues.....		a 388.43
<b>Total assets.....</b>		<b>46,575.57</b>
<b>LIABILITIES</b>		
<b>Investment of the United States:</b>		
Disbursement vouchers.....	908,802.19	
Transfer vouchers received.....	108,722.27	
		1,017,524.46
Collection vouchers.....	9,256.39	
Transfer vouchers issued.....	967,964.23	
		977,220.62
		40,303.84

a Credit.

Accounts payable:		
Unpaid labor.....	\$303.33	
Unpaid purchases.....	3,460.33	
Unpaid freight and express.....	154.75	
Unpaid passenger fares.....	1,823.83	
Unpaid miscellaneous.....	529.49	
		<u>\$6,271.73</u>
Total liabilities.....		46,575.57

TABLE 19.—*Assets and liabilities on June 30, 1909, secondary projects*

ASSETS		
Inventories:		
Equipment in use.....	\$1,771.90	
Storehouse.....	3,977.67	
		<u>\$5,749.57</u>
Cost of work:		
Building cost <sup>a</sup> .....		588,481.86
Total assets.....		<u>594,231.43</u>
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	\$578,109.94	
Transfer vouchers received.....	76,063.57	
		<u>654,173.51</u>
Collection vouchers.....	17,319.92	
Transfer vouchers issued.....	44,401.99	
		<u>61,721.91</u>
		592,451.60
Accounts payable:		
Unpaid labor.....	821.60	
Unpaid purchases.....	444.39	
Unpaid freight and express.....	106.61	
Unpaid passenger fares.....	309.96	
Unpaid miscellaneous.....	97.27	
		<u>1,779.83</u>
Total liabilities.....		<u>594,231.43</u>

TABLE 20.—*Assets and liabilities on June 30, 1909, Indian irrigation projects*

ASSETS		
Accounts receivable:		
Uncollected miscellaneous.....		\$17,265.06
Inventories:		
Mercantile store.....	\$3,995.83	
Government animals.....	31,341.23	
Equipment in use.....	19,780.89	
Storehouse.....	13,103.11	
Cement.....	117.12	
Lumber.....	3,408.17	
Explosives.....	1,919.33	
Forage.....	5,652.75	
Fuel.....	118.97	
Cash in office safe.....	227.57	
Unadjusted transfers.....	6,846.61	
Freight and handling undistributed.....	2,688.33	
		<u>89,199.91</u>
Cost of work:		
Building cost.....	177,930.40	
Less adjustments.....	\$1,183.15	
Less accrued revenues.....	136,355.53	
		<u>137,538.68</u>
		40,391.72
Total assets.....		<u>146,856.69</u>
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	213,427.79	
Transfer vouchers received.....	32,991.97	
		<u>246,419.76</u>
Collection vouchers.....	120,591.92	
Transfer vouchers issued.....	1,151.57	
		<u>121,743.49</u>
		124,676.27
Accounts payable:		
Unpaid labor.....	9,960.51	
Unpaid purchases.....	6,061.83	
Unpaid freight and express.....	5,940.75	
Unpaid passenger fares.....	126.86	
Unredeemed coupon books.....	90.47	
		<u>22,180.42</u>
Total liabilities.....		<u>146,856.69</u>

<sup>a</sup> The building cost may be determined by adding the total net investment as shown by Table 12 and the total accounts payable as shown by this statement and deducting from their sum the inventory amount shown above.

## SUMMARY OF COST BY PROJECTS

Montana:	
Blackfeet.....	\$95,299.76
Flathead.....	69,919.80
Fort Peck.....	12,548.37
Crow.....	5.09
Idaho:	
Fort Hall.....	157.38
<hr/>	
Total building cost as per debit in cost of work in statement of assets and liabilities.....	177,930.40

## EXPLANATION OF ASSETS AND LIABILITIES

The significance of the data shown in the statements of assets and liabilities for projects will be better understood after consideration of the following explanation of the items entering into the foregoing general statement of assets and liabilities.

The several items appear in the statement of assets and liabilities in the order in which they can or must be liquidated.

The accounts receivable are shown under six heads, as follows: Uncollected freight refunds, consisting of claims against railroads for contract concessions upon freight moved for contractors on irrigation work; uncollected water rentals, consisting of claims against irrigators for water furnished under rental contract; uncollected miscellaneous rentals, consisting of claims against the lessees of lands or buildings under the control of the service; uncollected miscellaneous, consisting of claims against contractors or other persons for services or materials furnished that will be deducted from current earnings by them; uncollected water-right building charges and uncollected water-right operation and maintenance charges, consisting of claims against water-right applicants for the portions of annual installments of water-right charges that have accrued under their applications but that have not become delinquent.

The inventories are self-explanatory, but an explanation of the methods of handling these accounts will make them more easily understood. With the regular use of Government animals and equipment there is a deterioration in value that should be written off from these asset accounts and included with that of cost of work. Actual depreciation is determined from time to time by surveys and appraisals or by sale, but pending such determination estimated wear and tear is credited to the respective accounts for depreciation and debited to cost of work, to be more accurately adjusted when appraisals or sales are made. Unadjusted transfers are for materials or services furnished by one project to another for which the vouchers have not been checked so as to warrant their entry to the proper accounts under inventories or cost of work.

Cost of work represents the outlay upon the net asset in the irrigation projects for which reimbursement will later be required from the water-right applicants. The bulk of the outlay is shown in the two accounts, building cost and operation and maintenance cost. The amount appearing in these two accounts is analyzed for each project in a subsidiary account that shows the cost of the principal physical features. A table showing an analysis of these costs by features is given in this report under each project. In computing the current costs for such features, there are certain expenses that can not be

accurately determined when incurred, but that are estimated as closely as possible, subject to readjustment at a later time. The expenses that must be thus estimated do not represent a large proportion of the cost of any feature of the work, but are numerous and varied in kind. Most of them arise from what are known as incidental operations, such as power plants, manufacturing shops, storehouses, mess houses, mercantile stores, etc. The net gain or loss on such operations is a decrease or increase of the actual cost of the project and of the features to which they have contributed. It is usually impracticable to revise and readjust the charges made for the benefits that these incidental operations have contributed to the various features, and therefore the gains or losses are applied only to the cost of the projects as a whole. The projects derive various revenues from dealings with the general public, such as rentals of lands and buildings, payment for services performed at its manufacturing shops, rentals of irrigating water, etc. These revenues do not reduce the original cost of the features whose operations produce the revenues, but they do reduce the cost of the entire project. The net cost of a project is, therefore, obtained from the building cost, operation and maintenance cost, adjustments and revenues.

The capital account represents the indebtedness of the service to the United States. The reclamation fund is ultimately reimbursable and therefore a liability. The amount of the liability would be the total amount appropriated to it, except that the acts of April 16 and June 27, 1906 (34 Stat. L., 116, 519), make the disbursements therefrom for the development of certain townsites a final expenditure that is not repayable to the service and accordingly not reimbursable to the United States. The total amount of such expenditures for townsite operations to June 30, 1909, is \$8,863.68. The law, furthermore, makes no provision for the return to the reclamation fund of amounts expended on the investigation of projects that prove ultimately to be not feasible.

The accounts payable are shown under ten heads, as follows: Unpaid labor, consisting of claims in favor of employees for services performed, the greater part of which is always paid on or before the 10th of the following month; unpaid purchases, consisting of claims in favor of merchants for current bills, most of which are paid within the following month; unpaid contract estimates and unpaid contract holdbacks, both consisting of claims in favor of contractors upon construction work, the former representing the amount now due and that will be paid as soon as settled by the auditor, and the latter representing the amount withheld until the completion of the work under the provisions of the contract; unpaid freight and express and unpaid passenger fares, consisting of claims in favor of transportation companies, both representing the estimated indebtedness for transportation furnished by carriers, the respective charges being secured for freight from delivering agents' expense bills, for express from delivering agents' verbal statements of the charges, and for passenger fares from ticket sellers' verbal statements of the fares; unpaid land agreements, consisting of claims in favor of the grantors of real property upon negotiated contracts for the acquisition of their titles and not payable until complete investigation of such titles and final determination of the exact amounts payable to the grantors;

unredeemed coupon books and meal tickets, consisting of employees' claims that are not payable in cash except upon discharge, but for which they are entitled to receive appropriate issues at the mercantile stores and mess houses; and unpaid miscellaneous, consisting of claims payable in cash that do not properly come within the limits of the foregoing classes of liabilities.

The repayment accounts are set forth separately and treated as liabilities, as it is desirable to show the total amount of repayments accrued. They might, perhaps, very properly be considered as a reduction of the asset account "cost of work," since that account, as an asset, is reduced by repayments.

### RIO GRANDE DAM

The act of March 4, 1907 (34 Stat. L., 1357), provided an appropriation of \$1,000,000 toward the construction of a dam in the bed of the Rio Grande for storing and delivering water as provided by a convention between the United States and Mexico. Tables 21, 22, and 23 show the transactions under this appropriation and its condition on June 30, 1909, and are similar to the tables relating to the reclamation fund.

TABLE 21.—*Special appropriation for Rio Grande dam (34 Stat. L., 1357) to June 30, 1909.*

	Debit.	Credit.
Appropriation warrant, No. 19, March 4, 1907.....		\$1,000,000.00
Disbursements (905 vouchers).....	\$146,001.68	
Collections (18 vouchers).....		75.22
Balance with Swan T. Olsen, special fiscal agent.....	24,642.08	
Balance with Treasurer of the United States.....	829,431.46	
Total.....	1,000,075.22	1,000,075.22

TABLE 22.—*Balances of Rio Grande dam appropriation with Treasurer of the United States, June 30, 1907, to June 30, 1909<sup>a</sup>*

Fiscal year.	Appropriation.	Withdrawals.	Balances.
1907.....	\$1,000,000.00		\$1,000,000.00
1908.....		\$33,113.21	966,886.79
1909.....		137,074.22	829,812.57
Totals and balance per Treasury accounts, June 30, 1909.....	1,000,000.00	170,187.43	829,812.57
To reconcile with accounts of the Reclamation Service: For item not in above but in Reclamation Service accounts, per direct settlement by the auditor, add to withdrawals.....		381.11	381.11
Totals and balance per Reclamation Service accounts.....	1,000,000.00	170,568.54	829,431.46

<sup>a</sup> The appropriation and balance shown in this table for the fiscal years 1907, 1908, and 1909 are taken from the books and financial statements of the Treasury Department.



TABLE 23.—*Disbursement and collection vouchers (Rio Grande dam appropriation) paid and collected to June 30, 1909*

Quarter ending—	Disbursement vouchers.		Collection vouchers.	
	Number.	Amount.	Number.	Amount.
March 31, 1908.....	78	\$7,888.14	.....	.....
June 30, 1908.....	144	16,717.46	16	\$68.70
September 30, 1908.....	163	22,484.55	1	5.00
December 31, 1908.....	137	33,740.30	.....	.....
March 31, 1909.....	199	26,836.99	1	1.52
June 30, 1909.....	184	38,325.24	.....	.....
Total.....	905	146,001.68	18	75.22

## UNIT PRICES UNDER FORMAL SPECIFICATIONS

In the table below are given the principal unit prices bid for work and materials and contract unit prices therefor in connection with formal specifications, proposals for which have been received by the Reclamation Service during the fiscal year ending June 30, 1909. In almost all cases contracts have been awarded to the lowest bidder, but as the contracts have been awarded on definite divisions of the work as a whole, it has frequently happened that the contract price for a particular item is higher than the lowest bid on that item.

## Unit bids and contract prices

## CONCRETE

State and project.	Date.	Specifi- cation No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
California: Orland.....	Aug. 27, 1908	155	East Park dam.....	Cubic yard.....	12,400	\$2.72	\$4.35	\$4.81
Do.....	do.....	155	East Park spillway.....	do.....	1,000	4.45	5.00	4.37
Washington: Sunnyside (Yakima).....	July 15, 1908	152	Sulphur Creek wasteway.....	do.....	1,000	10.00	10.00	10.00

## EMBANKMENT

California: Orland.....	Aug. 27, 1908	155	East Park dikes.....	Cubic yard.....	4,000	\$0.25	\$0.48	\$0.50
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## EXCAVATION

California: Orland.....	Aug. 27, 1908	155	East Park dam, above bed rock.....	Cubic yard.....	3,000	\$0.94	\$1.50	\$2.25
Do.....	do.....	155	East Park spillway, above bed rock.....	do.....	900	.25	.25	.625
Do.....	do.....	155	East Park dam, bed rock above elevation 100.....	do.....	60	2.40	2.96	3.12
Do.....	do.....	155	East Park dam, bed rock below elevation 100.....	do.....	265	2.50	2.70	2.81
Do.....	do.....	155	East Park spillway, bed rock.....	do.....	250	1.00	1.00	1.25
Washington: Sunnyside (Yakima).....	July 15, 1908	152	Sulphur Creek wasteway channel.....	do.....	310,000	.09	.17	.09
Do.....	do.....	152	Sulphur Creek wasteway, for structures, without sheeting.....	do.....	3,500	.40	.60	.60
Do.....	do.....	152	Sulphur Creek wasteway, for structures, with sheeting.....	do.....	5,000	.70	.75	.70

## FUEL OIL

Arizona: Salt River.....	Aug. 3, 1908	156	Delivered at Roosevelt.....	Barrel.....	33,000	\$4.40	\$5.05	\$4.40
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## Unit bids and contract prices—Continued

## GATE-CONTROLLING DEVICES

State and project.	Date.	Specifi- cation No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Idaho: Minidoka.....	Apr. 20, 1909	157	For 10-foot penstock gate, imme- diate shipment.	Lump sum.....	3	\$4,955.00	\$7,200.00	\$4,955.00
Do.....	.....do.....	157	For 10-foot penstock gate, optional one year.	.....do.....	1	1,650.00	2,400.00	1,650.00
Do.....	.....do.....	157	For sluicing gate, optional one year.	.....do.....	1	470.00	None.	470.00
Do.....	.....do.....	157	For sluicing gate, optional two years.	.....do.....	2	766.00	None.	766.00

## HANDLING GATES, GUIDES, ETC.

California: Orland.....	Aug. 27, 1908	155	East Park dam.....	Pound.....	25,000	\$0.015	\$0.02	\$0.064
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## HANDLING REINFORCING STEEL, BOLTS, ETC.

California: Orland.....	Aug. 27, 1908	155	East Park dam.....	Pound.....	5,000	\$0.01	\$0.01	\$0.025
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## LIMIT SWITCHES

Idaho: Minidoka.....	Apr. 20, 1909	157	For sluicing gate, optional one year. For sluicing gate, optional two years.	Lump sum.....	1 2	\$75.00 130.00	None. None.	\$75.00 130.00
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## RIPRAP

Washington: Sunnyside (Yakima).....	July 15, 1908	152	Sulphur Creek wasteway, laid with mortar.	Cubic yard.....	105	\$5.50	\$7.00	\$8.00
Do.....	.....do.....	.....	Sulphur Creek wasteway, laid dry.	.....do.....	1,680	5.00	5.25	7.50

## ROCK PITCHING

California: Orland.....	Aug. 27, 1908	155	East Park dikes.....	Cubic yard.....	700	\$1.00	\$1.39	\$1.50
SHEET PILING IN PLACE								
Washington: Sunnyside (Yakima).....	July 15, 1908	152	Sulphur Creek wasteway.....	M feet b. m.....	94,000	\$30.00	\$40.00	\$30.00

## RECLAMATION ORGANIZATION

## GENERAL OFFICES

Hon. Richard A. Ballinger, Secretary of the Interior.  
 Frederick Haynes Newell, Director of the Reclamation Service, Washington, D. C.  
 Arthur Powell Davis, chief engineer, Washington, D. C.  
 Morris Bien, supervising engineer, in charge land and legal division, Washington, D. C.  
 O. H. Ensign, chief electrical engineer, 626 Citizens National Bank Building, Los Angeles, Cal.  
 D. W. Murphy, engineer, in charge of Washington office engineering, Washington, D. C.  
 D. C. Henny, consulting engineer, 501 Beck Building, Portland, Oreg.  
 A. J. Wiley, consulting engineer, Boise, Idaho.  
 W. H. Sanders, consulting engineer, 915 Grand View avenue, Los Angeles, Cal.  
 J. H. Quinton, consulting engineer, 1016 West Eighth street, Los Angeles, Cal.  
 Joseph Jacobs, consulting engineer, Portland, Oreg. (Detailed to Porto Rican irrigation service.)  
 A. E. Chandler, engineer, land and legal matters in field, room 12, Agricultural Building, University of California, Berkeley, Cal.  
 W. H. Code, chief engineer, Indian irrigation, consultation on Indian matters, 522 Bumiller Building, Los Angeles, Cal.  
 W. W. Follett, consulting engineer, International (Water) Boundary Commission, consultation on Rio Grande, El Paso, Tex.  
 C. S. Slichter, consulting engineer for underground waters, 636 Francis street, Madison, Wis.  
 E. T. Perkins, engineer in charge, purchasing and transportation, 777 Federal Building, Chicago, Ill.  
 C. J. Blanchard, statistician, Washington, D. C.  
 J. Y. Jewett, cement expert, 408 Commonwealth Building, Denver, Colo.  
 E. G. Paul, chief clerk, Washington, D. C.  
 N. E. Webster, jr., consulting accountant, Washington, D. C.  
 V. G. Croissant, accountant, Washington, D. C.  
 E. G. Lind, chief fiscal officer, Washington, D. C.  
 F. E. Huffer, fiscal inspector, Rupert, Idaho.  
 C. G. Duganne, fiscal agent, Washington, D. C.

## SOUTHERN DIVISION

## ARIZONA, CALIFORNIA, NEW MEXICO, TEXAS, UTAH

L. C. Hill, supervising engineer, Phoenix, Ariz.; J. D. Stannard, engineer; C. S. Witbeck, examiner; S. B. Taggart, chief clerk; C. B. Barnhard, fiscal agent.  
*Salt River project.*—C. W. Smith, engineer, Roosevelt, Ariz.; F. Teichman and W. A. Farish, engineers; H. S. Reed, assistant engineer, operation and maintenance of canals, Phoenix, Ariz.  
*Yuma project.*—F. L. Sellev, project engineer, Yuma, Ariz.; L. M. Lawson, acting project engineer; E. D. Vincent, engineer; A. N. Kelley, chief clerk; C. A. Lindeman, fiscal agent.  
*New Mexico projects.*—W. M. Reed, district engineer, Carlsbad, N. Mex.; P. W. Dent, assistant examiner; W. H. Frankland, chief clerk; S. T. Olsen, fiscal agent, Engle, N. Mex.  
*Carlsbad project.*—L. E. Foster, in charge of operation and maintenance, Carlsbad, N. Mex.  
*Hondo project.*—L. W. Bartholomew, in charge of operation and maintenance, Roswell, N. Mex.  
*Leasburg project.*—Earl Patterson, in charge of operation and maintenance, Selden, N. Mex.  
*Rio Grande project.*—H. J. Gault and J. A. French, engineers, Engle, N. Mex.  
*Strawberry Valley project.*—J. L. Lytel, project engineer, Provo, Utah; A. J. Hughes, chief clerk; F. W. Brose, fiscal agent.

## PACIFIC DIVISION

## CALIFORNIA, OREGON, NEVADA

E. G. Hopson, supervising engineer, 501 Beck Building, Portland, Oreg.

*Orland project.*—W. W. Schlecht, project engineer, Orland, Cal.; A. N. Burch, irrigation manager; C. H. Lillingston, chief clerk; J. W. Spencer, fiscal agent.

*Truckee-Carson project.*—Operation and maintenance: T. H. Means, project engineer, Fallon, Nev.; C. F. Carpenter, chief clerk; F. G. Hough, fiscal agent. Construction: D. W. Hays, engineer.

*Umatilla project.*—H. D. Newell, project engineer, Hermiston, Oreg.; R. W. Hawley, superintendent of irrigation; O. P. Morton, examiner; E. S. Taylor, assistant examiner; C. W. Kellogg, chief clerk and fiscal agent.

*Klamath project.*—W. W. Patch, project engineer, Klamath Falls, Oreg.; William Sargeant, L. W. Hall, and B. H. Davis, engineers; W. S. Wiley, examiner; E. W. Burr, assistant examiner; C. C. Hogue, chief clerk and fiscal agent; W. H. Heileman, engineer, operation and maintenance.

## NORTHERN DIVISION

## MONTANA, NORTH DAKOTA, WYOMING

H. N. Savage, supervising engineer, Helena, Mont.; C. P. Williams, engineer; W. J. Egleston, examiner.

*Blackfeet project.*—G. E. Goodwin, project engineer, Family, Mont.; C. E. Frisbee, chief clerk; Jay Brown, fiscal agent.

*Flathead project.*—E. F. Tabor, project engineer, St. Ignatius, Mont.; C. W. Donnelly, chief clerk; H. N. Bickel, fiscal agent.

*Fort Peck project.*—R. M. Conner, acting project engineer, Oswego, Mont.; A. J. Hayes, assistant engineer; C. J. Moody, assistant engineer; Claude Glenn, chief clerk and fiscal agent.

*Huntley project.*—M. E. Reed, superintendent of irrigation, Huntley, Mont.; W. S. Arthur, chief clerk and fiscal agent.

*Milk River project.*—C. C. Babb, project engineer, Malta, Mont.; R. M. Conner, engineer; E. L. Hendrix, chief clerk; Esco Hamilton, fiscal agent.

*Sun River project.*—S. B. Robbins, project engineer, Fort Shaw, Mont.; J. E. Moran, chief clerk.

*Little Missouri project.*—G. E. Stratton, project engineer, Dickinson, N. Dak.

*Missouri River pumping projects.*—H. A. Storrs, electrical engineer in charge, Williston, N. Dak.

*Buford-Trenton and Williston projects.*—G. O. Sanford, project engineer, Williston, N. Dak.; H. T. Brown, chief clerk; W. H. Meglasson, fiscal agent.

*Lower Yellowstone project.*—R. S. Stockton, irrigation manager, Glendive, Mont.; Joseph Wright, engineer; F. J. Israel, fiscal agent.

*Shoshone project.*—W. A. Sickler, superintendent of irrigation, Powell, Wyo.; C. A. Peavy, chief clerk; H. T. Caldwell, fiscal agent.

*Shoshone dam.*—D. W. Cole, engineer, Cody, Wyo.

## CENTRAL DIVISION

## COLORADO, KANSAS, OKLAHOMA, SOUTH DAKOTA, NEBRASKA, WYOMING

I. W. McConnell, supervising engineer, 429 Commonwealth Building, Denver, Colo.; J. R. Alexander, examiner.

*Grand Valley project.*—E. E. Sands, project engineer, Grand Junction, Colo.; H. E. Easley, chief clerk and fiscal agent.

*Uncompahgre project.*—C. T. Pease, project engineer, Montrose, Colo.; H. L. Daniels, engineer; J. M. Luney, chief clerk; V. T. Barry, fiscal agent.

*Garden City project.*—C. E. Hogle, assistant engineer in charge, Deerfield, Kans.; J. J. Buck, chief clerk and fiscal agent.

*North Platte project.*—Andrew Weiss, project engineer, Mitchell, Nebr.; A. F. Ross, engineer; E. D. Newman, chief clerk; O. P. Burrows, fiscal agent.

*Pathfinder dam.*—L. V. Branch, engineer, Pathfinder, Wyo.

*Belle Fourche project.*—R. F. Walter, project engineer, Belle Fourche, S. Dak.; E. R. Mills, chief clerk; J. A. Dolphin, fiscal agent.

## IDAHO DIVISION

## IDAHO, OREGON, WYOMING

F. E. Weymouth, supervising engineer, Boise, Idaho; B. E. Stoutemyer, examiner. *Minidoka project*.—J. G. Camp, project engineer, Rupert, Idaho; C. A. Lyman, chief clerk; G. E. Moore, fiscal agent.

*Payette-Boise project*.—F. W. Hanna, project engineer, Boise, Idaho; G. H. Bliss and J. L. Rhead, engineers; F. L. Cavis, chief clerk; R. R. Clawson, fiscal agent.

*Malheur investigations*.—C. H. Paul, engineer, Ontario, Oreg.; J. P. Waite, chief clerk.

## WASHINGTON DIVISION

## WASHINGTON

C. H. Swigart, supervising engineer, 305 Miller Building, North Yakima, Wash.; R. B. Williamson and H. B. Gilbert, examiners.

*Okanogan project*.—Ferdinand Bonstedt, project engineer, Okanogan, Wash.; Lars Bergsvik, engineer; H. A. Yates, chief clerk and fiscal agent.

*Yakima project*.—J. S. Conway, assistant supervising engineer, North Yakima, Wash.; A. H. Gullickson, chief clerk; J. C. Gawler, fiscal agent.

Storage unit: J. D. Fauntleroy, engineer, Naches, Wash.

Sunnyside unit: Construction: Ernest McCulloh, project engineer, Sunnyside, Wash.; N. K. Buck, fiscal agent. Maintenance and operation: W. N. Granger, superintendent of irrigation, Zillah, Wash.; E. M. Philebaum, fiscal agent.

Tieton unit: J. S. Conway, acting project engineer, North Yakima, Wash.

Wapato unit: Christian Andersen, project engineer, Toppenish, Wash.; A. S. Hayden, chief clerk.

Kittitas investigations: E. H. Baldwin, engineer, Ellensburg, Wash.

## DISCUSSION OF PROJECTS

### ARIZONA

#### LITTLE COLORADO PROJECT

A general description of the Little Colorado project is given in the third annual report. The work on the project during the fiscal year has consisted mainly in the gaging of streams, and the total expenditure to June 30, 1909, amounted to \$9,330.68.

#### SALT RIVER PROJECT

##### LOCATION AND CLIMATIC CONDITIONS

State: Arizona.

Counties: Maricopa, Gila.

Townships: 7 N. to 2 S., Rs. 2 W. to 14 E., Gila and Salt River meridian.

Railroads: Gila Valley, Globe and Northern; Sante Fe, Prescott and Phoenix; Maricopa, Phoenix and Salt River Valley.

Railroad stations: Phoenix, Tempe, Mesa, and Globe, Ariz.

Average elevation of irrigable area: 1,200 feet above sea level.

Average annual rainfall on irrigable area: 7 inches.

Range of temperature on irrigable area: 20° F. to 120° F.

##### WATER SUPPLY

Source of water supply: Salt and Verde rivers and wells.

Area of drainage basins: Salt River, 6,260 square miles; Verde River, 6,000 square miles.

Average elevation of drainage basins: 4,500 feet above sea level.

Average annual rainfall on drainage basins: 15 inches.

Average annual run-off of drainage basins: Salt River, 800,000 acre-feet at Roosevelt dam; Verde River, 580,000 acre-feet at McDowell.

##### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Roosevelt—Area, 16,320 acres; capacity, 1,284,000 acre-feet; length of spillway, 400 feet; elevation of spillway, 220 feet above stream bed.

Storage dam: Roosevelt—Type, rubble masonry arch gravity; maximum height, 280 feet; length of crest, 1,080 feet; contents, 326,000 cubic yards.

Diversion dams: Granite Reef—Type, rubble concrete weir; maximum height, 38 feet; length of masonry, 1,100 feet. Power canal—Type, rubble concrete weir; maximum height, 12½ feet; length of masonry, 400 feet.

Length of canals: 69 miles with capacities greater than 300 second-feet; 50 miles with capacities less than 300 and greater than 50 second-feet.

Aggregate length of tunnels: 9,780 feet.

Power development: 4,400 horsepower from power canal, 3,000 horsepower from Roosevelt reservoir.

Construction of project authorized: March 14, 1903.

Per cent completed: 81.

##### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 240,000 acres; gravity system, 190,000 acres; pumping system, 50,000 acres.

Ownership of irrigable lands (whole project): State, 14,080 acres; private, 225,920 acres.



Lands irrigated, season of 1909: 126,718 acres.

Character of soil of irrigable area: Sandy loam, with clay in places.

Principal products: Semitropical fruits, cereals, alfalfa.

Principal markets: Phoenix and other Arizona towns, Pacific coast cities, and eastern markets.

#### GENERAL STATEMENT

A detailed description of the Salt River project may be found in the third annual report, and general descriptions of the project and of the progress of work thereon are given in the other annual reports. Briefly, the irrigation plan of this project provides for a large storage reservoir controlled by Roosevelt dam on Salt River, at Roosevelt, Ariz., about 70 miles northeast of Phoenix; Granite Reef dam, on the same stream, about 40 miles below Roosevelt dam, diverting water into the old Arizona canal on the north side of the river and into South canal on the south side of the river; and the enlargement of the former canal and consolidation of the canal systems in Salt River Valley in the vicinity of Phoenix and Mesa, Ariz., into two systems receiving water from these two canals. The canal systems on the north side of the river have been purchased by the Government, and are now being operated by the Reclamation Service under water-rental contracts. A power plant is being constructed at the storage dam for generating power from stored water in the reservoir and from water delivered from a power canal heading at a diversion dam on Salt River about 18½ miles above the storage dam. This power will be partly used for pumping water from underground sources to high lands in the Gila River Indian Reservation and in Salt River Valley and the residue sold for industrial uses. The power canal diversion dam, the power canal, and Granite Reef dam are completed; Roosevelt dam, the power plant, the improvements of the Arizona canal system, and the wells for underground pumping are under construction.

#### ROOSEVELT DAM

The first stone was laid in Roosevelt dam September 20, 1906, and on June 30, 1908, a total of 97,929 cubic yards of masonry had been placed. From July 1, 1908, to June 30, 1909, there were laid 153,655 cubic yards of masonry, making a total at the latter date of 251,594 cubic yards in place.

At an elevation of 106 feet above stream bed a gap 40 feet wide was left in the dam for passing the flow of the river. The elevation of masonry north of the gap is 110 feet and south of the gap it ranges from 140 feet to 170 feet. Considerable delay was caused in November on account of lack of cement, and in January on account of lack of power while extending the penstock tunnel connection into the power house. At the end of June, 1909, the dam was 80 per cent completed.

#### OUTLET TUNNEL AND GATES

On May 8, 1909, the gates of the outlet tunnel were closed, and it was found that the tunnel floor had been badly eroded. It was therefore decided to keep the gates closed until the tunnel could be lined with concrete and otherwise protected. At the end of June the concrete lining had been completed and preparations were being made to protect the walls of the tunnel near the gates with heavy steel plates.

#### POWER PLANT

The power for operations at Roosevelt during the fiscal year has been furnished by the temporary power plant operating for 234 days, by vertical generator No. 1 of the permanent power plant operating for 90 days, and by vertical generator No. 3 operating from June 10 to the end of the month. During January extensions of the penstocks were made to generator units Nos. 2 and 3 of the permanent power plant and the necessary regulating valves were installed. Generator No. 3 was put in operation June 10, and generator No. 2 will be ready for operation early in July.

#### POWER CANAL

The power canal has been in constant use during the year except from January 2 to January 23, during which time water was shut out of the canal to permit extensions of the penstock to be made in the power house. While the canal was empty the concrete-lined sections of the canal were cleaned and repairs were made in the floor of one of the tunnels.

#### CEMENT PLANT

The cement plant was operated 283 days during the fiscal year with a total output of 114,853 barrels of clinker burned and 115,801 barrels ground; 116,845 barrels of cement were used, about 96 per cent thereof being utilized in Roosevelt dam, and most of the remainder in concrete work about the power house, transformer house, and settling basin.

#### SOUTH CANAL

The construction of South canal, about 2 miles in length and designed to connect the canals of the south side with Granite Reef dam, was completed early in June, 1909, except for a length of about 400 feet leading into Consolidated canal at about where it is proposed to construct a power house to utilize for power purposes a drop of about 25 feet for 1,000 second-feet of water. A by-pass into Consolidated canal has, however, been constructed, so that the South canal is now available for use.

#### ARIZONA CANAL

The construction of a new boat for the dredge to be used in enlarging Arizona canal was commenced in July, 1908. On December 7 the machinery had been installed and the operation of the dredge had been commenced. Except for fourteen days early in March, when water was out of the canal, the dredge was operated until the end of the fiscal year with little interruption, and material to the amount of 113,614 cubic yards was removed. A new Lidgerwood excavator was purchased for use in enlarging this canal, and work therewith will be started at Evergreen and continued down the canal.

## GRAND CANAL

The work of enlarging Grand canal was continued during the year till May 30, at which time it was temporarily suspended. The total excavation on this canal during the year was 182,545 cubic yards, and the amount of concrete placed in various structures thereon, to the end of June, 1909, is 3,530 cubic yards. The first unit of Grand canal was completed in October, 1908, and has since been in operation.

## WELL DRILLING

On Gila River Indian Reservation two wells had been completed before the beginning of the fiscal year, and seven more wells were drilled during the period from July 1, 1908, to March 20, 1909. The wells were cased with a double steel casing 16 inches in diameter, and have an average depth of 223 feet. They supply a satisfactory amount of water.

Experiments are being made in sinking around drilled wells concrete caissons to some depth into water-bearing strata in the hope of thus obtaining a greater volume of water. If the results are satisfactory, all of the nine wells already drilled will be completed in this manner.

A second well-drilling outfit was purchased during the year and first used to drill a well in the city of Mesa. This well was sunk to a depth of 163 feet, and penetrated a bowlder formation that was more difficult to work than the formations encountered on the Gila reservation. Other wells have been, and are, being drilled in a district 6 to 8 miles south of Mesa, one drilling outfit having been moved into this district December 7, 1908, and the other March 27, 1909. On June 30, 1909, ten wells had been completed in this district having an average depth of 234 feet, and two unfinished wells had been drilled to an average depth of 215 feet. These wells are arranged in groups of three wells each. Those that have been completed penetrate fine water-bearing strata and yield from 1.25 to 2.21 second-feet of water each, with a drawdown of from 4 to 9.33 feet. The water is of excellent quality. Tentative plans have been made for drilling eight or ten wells on the reservation south of Gila River.

## TRANSMISSION LINE

During the year the transmission line was completed from Roosevelt to Phoenix, a distance of 75 miles. There are two circuits, each made up of three wires for the whole of the distance. A branch line, 19 miles long, consisting of a single circuit of three wires taken off at a switching station located  $1\frac{1}{2}$  miles northeast of Mesa, has been constructed to the Gila River Indian Reservation. The transmission line east of the irrigated lands is supported by towers each standing on and bolted to four concrete piers. In the settled portion of the valley the line is supported by tripartite poles embedded in concrete.

A transformer house, situated near the power house at Roosevelt, has been completed and equipped with the necessary transformers to deliver the current to the transmission line at 45,000 volts. A switching station has been erected near Mesa and equipped with

electrical apparatus. A cottage has also been erected in this vicinity. A power substation about 8 miles south of Mesa was nearing completion at the close of June. A power substation is planned for the Gila reservation, and its construction will be commenced soon. In addition to equipping these substations, about 10 miles of distributing line for each and the installation of necessary motors and pumps will be required. That part of the electrical equipment which will be used in generating and delivering electrical energy to the city of Phoenix will be tested during the last week in July, and about fifteen or twenty days later the Pacific Gas and Electric Company of Phoenix will be ready to receive the power.

## STOREHOUSES

During the year a frame and galvanized-iron storehouse was completed in Mesa, and one of reenforced concrete in Phoenix.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Salt River project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
24	Nov. 14, 1904	Llewellyn Ironworks..	Gates.....	\$102,000.00	a \$128,832.18	July 14, 1906
32	Feb. 4, 1905	Wolf Sachs.....	Hauling freight.....	75,000.00	79,045.45	
33	Feb. 10, 1905	C. R. Eager & Co.....	Fuel oil.....	174,000.00	a 174,019.49	
35	Apr. 8, 1905	J. M. O'Rourke & Co...	Roosevelt dam.....	1,197,600.00	1,127,703.05	
79	Dec. 20, 1905	General Electric Co...	Electrical apparatus.	32,521.00	25,630.00	Feb. 20, 1908
85	Jan. 15, 1906	S. Morgan Smith Co...	Water wheels.....	19,165.00	19,255.00	Sept. 10, 1908
181	June 5, 1907	U. S. Wind Engine and Pump Co.	Transmission line supports.	58,971.50	a 37,251.43	
184	June 4, 1907	B. F. Kierulff, jr., & Co.	Transmission line poles.	42,600.00	a 34,141.60	
208	Oct. 31, 1907	General Electric Co...	Electrical apparatus.	36,304.00	38,266.00	June 25, 1908
210	Nov. 7, 1907	John A. Roebling's Sons Co.	Copper wire.....	95,424.90	a 101,956.96	Apr. 12, 1908
223	Mar. 16, 1908	United Kansas Portland Cement Co.	Cement.....	3,000.00	3,751.11	Oct. 1, 1908
258	Oct. 1, 1908	Iola Portland Cement Co.	.....do.....	3,000.00	3,308.80	June 1, 1909
273	Feb. 25, 1909	.....do.....	.....do.....	25,200.00	4,096.00	Dec. 1, 1909

a Completed.

## OPERATION

The operation by the United States Reclamation Service of canal systems in the Salt River Valley continued throughout the past year along practically the same lines as during the previous year. Necessary repairs and work incidental to the operation of the systems have been carried forward. Many structures have been rebuilt of wood, while others have been replaced by concrete structures. A few miles of canal extensions required by the constantly increasing acreage under the system have been made.

The canals in operation and their mileage of main canals and laterals and sublaterals are as follows:

	Miles.
Arizona canal.....	42
Arizona canal, laterals and sublaterals.....	196½
Cross Cut canal.....	3½
Grand Cross Cut canal.....	½
Joint Head canal.....	1½
Salt River Valley canal.....	15
Salt River Valley canal, laterals and sublaterals.....	8½
Maricopa canal.....	15½
Maricopa canal, laterals and sublaterals.....	9
Grand canal system.....	19½
Grand canal system, laterals and sublaterals.....	15½

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Granite Reef dam has been used for about one year with practically no expense for maintenance, and has been of great value to the canal system.

The Joint Head dam, which is a rock and brush dam at the head of the Salt River Valley and Maricopa canals, was carried away in the floods of the early winter, but it was not necessary to replace it until the month of May, when it was entirely rebuilt in ten days. A good supply of water has since been secured at this point. The acreage cultivated during the summer season of 1908 was 53,804 acres, and during the winter season of 1908-9, which terminated May 15, the acreage cultivated was 75,517.95 acres. These areas include that of lands cultivated under the Grand canal system, crop returns for which have not been received.

The summer season has generally been devoted to the cultivation of garden truck and alfalfa and to dairying, but this year sugar beets have also been grown on a commercial basis, a total area of about 4,000 acres having been planted to this crop. A beet-sugar factory opened June 10, and will soon conclude a successful season's work. Crop reports show in many instances as high as 20 or 30 tons of beets per acre. The planting of sugar beets was begun in November and continued until April, but the best results were obtained from those planted in January.

## STATISTICS OF CULTIVATION AND CROPS

The following table shows the approximate amounts of land within the project irrigated and cultivated during the past few years:

*Lands irrigated and cultivated within Salt River project*

Township.	1905-6.	1906-7.	1907-8.	1908-9.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
1 S., R. 1 E.....		120	120	360
1 N., R. 1 W.....	127		100	589
1 N., R. 1 E.....	3,745	3,967	5,068	6,458
2 N., R. 1 E.....	7,392	8,578	10,651	12,096
3 N., R. 1 E.....	810	953	1,143	2,060
1 S., R. 2 E.....		1	1	
1 N., R. 2 E.....	10,421	12,842	11,890	12,065
2 N., R. 2 E.....	8,543	10,400	12,190	16,249
3 N., R. 2 E.....	1,942	1,663	2,107	3,235
1 N., R. 3 E.....	10,954	10,198	12,222	11,619
2 N., R. 3 E.....	6,825	7,962	8,818	10,363
3 N., R. 3 E.....	225	272	392	539
1 S., R. 4 E.....	8,537	9,103	8,377	9,769
1 N., R. 4 E.....	10,600	11,582	11,130	10,956
2 N., R. 4 E.....	950	1,087	1,302	1,731
1 S., R. 5 E.....	9,459	10,065	10,291	10,611
1 N., R. 5 E.....	14,555	13,333	14,641	15,896
1 S., R. 6 E.....	390	263	360	450
1 N., R. 6 E.....	1,112	1,327	1,429	1,356
2 N., R. 6 E.....	274	299	346	325
Total.....	96,861	104,014	112,578	126,717

The table below shows the proportions of the same areas that were devoted to the more important classes of crops:

*Per cent of the whole areas irrigated and cultivated devoted to various principal crops*

Crop.	1905-6.	1906-7.	1907-8.	1908-9.
Alfalfa.....	55.0	57.7	61.0	55.0
Barley.....	19.0	24.4	19.0	23.0
Pasture.....	9.0	8.3	8.0	6.7
Wheat.....	7.3	2.3	4.0	4.7
Oats.....	2.1	2.0	2.0	1.9
Sorghum.....	1.6	.5	.5	.3
Sugar beets.....	2.8		.1	3.8
Cantaloupes and melons.....	.8	.5	1.3	.7
Fruit.....	1.6	1.6	1.0	1.6
Miscellaneous.....	.8	2.7	3.1	2.3
Total.....	100.0	100.0	100.0	100.0

A summary of crop reports collected by ditch tenders or zanjeros during the past two years for lands irrigated from canal systems operated by the Reclamation Service is shown in the following table, except that no reports are included for lands under the Grand canal system:

*Summary of crop reports on lands irrigated by the Reclamation Service, Salt River project*

Crop.	Irrigated and cultivated—	
	1907-8.	1908-9.
	<i>Acres.</i>	<i>Acres.</i>
Alfalfa.....	39,068	39,280
Barley.....	14,007	17,714
Pasture.....	3,088	1,520
Wheat.....	2,435	2,742
Oats.....	1,555	1,754
Sorghum.....	98	209
Sugar beets.....		3,990
Cantaloupes and melons.....	630	403
Fruit.....	1,434	1,723
Miscellaneous.....	555	764
Total.....	62,870	70,099

An estimate derived from careful compilations by a special field agent of the Department of Agriculture places the average value per acre of the crops grown on the project at \$39.60.

#### FINANCIAL STATUS

##### *Assets and liabilities on June 30, 1909, Salt River project*

#### ASSETS

Accounts receivable:			
Uncollected miscellaneous rentals.....		\$488.66	
Uncollected miscellaneous.....		3,056.11	
			\$3,544.77
Inventories:			
Government animals.....	\$20,845.55		
Less depreciation.....	106.46		
		20,739.09	
Equipment in use.....	57,237.69		
Less depreciation.....	20,096.69		
		37,141.00	
Storehouse.....		107,123.10	
Cement.....		20,779.43	
Lumber.....		111.31	
Explosives.....		2,468.74	
Fuel.....		14,251.43	
Cash in office safe.....		2,669.61	
Local products.....		892.20	
Unadjusted transfers.....		3,039.39	
Freight and handling undistributed.....		43,131.95	
			252,347.25
Cost of work:			
Building cost.....		7,441,625.84	
Less adjustments.....	19,979.77		
Less accrued revenues.....	203,978.23		
		223,958.00	
			7,217,667.84
Total assets.....			7,473,559.86

#### LIABILITIES

Investment of the United States:			
Disbursement vouchers.....	7,186,883.86		
Transfer vouchers received.....	197,205.59		
		7,384,089.45	
Collection vouchers.....	344,842.04		
Transfer vouchers issued.....	14,019.49		
		358,861.53	
			7,025,227.92

<b>Accounts payable:</b>	
Unpaid labor.....	\$37,751.72
Unpaid purchases.....	17,382.17
Unpaid contract estimates.....	84,047.52
Unpaid contract holdbacks.....	136,120.00
Unpaid freight and express.....	71,869.93
Unpaid passenger fares.....	394.75
Unredeemed coupon books.....	205.85
Unpaid miscellaneous.....	560.00
	<hr/>
	\$348,331.94
<b>Repayments accrued:</b>	
Building.....	100,000.00
	<hr/>
<b>Total liabilities.....</b>	<b>7,473,559.86</b>

*Feature costs to June 30, 1909, Salt River project*

<b>Storage works:</b>	
Roosevelt dam and spillway.....	\$2,226,455.11
Sluicing tunnel.....	73,424.77
Hydraulic gates.....	227,398.86
Reservoir.....	929.07
Outlet tunnel.....	104.43
Land submerged by reservoir.....	140,993.29
	<hr/>
	\$2,669,305.53
<b>Power system:</b>	
Diversion dam.....	117,095.38
Power canal.....	1,230,258.07
Settling basin.....	13,305.51
Penstock tunnel.....	66,485.07
Auxiliary penstock.....	8,288.11
Installing machinery, power plant.....	98,956.95
Hydro-electric power building.....	157,057.25
Power house No. 2.....	1,077.80
Penstock dam.....	13,762.85
Transformer house.....	110,574.83
Transmission line.....	336,645.01
Switching station.....	26,615.06
Substation No. 1.....	15,302.92
Substation No. 2.....	9,537.89
	<hr/>
	2,204,962.70
<b>Granite Reef dam:</b>	
Borings.....	6,589.25
Diversion dam.....	569,908.93
Arizona canal heading.....	30,854.76
Park.....	1,634.68
	<hr/>
	608,987.62
<b>North side canal system:</b>	
Arizona canal.....	514,542.23
Grand canal.....	244,272.36
Maricopa canal.....	67,329.01
Salt canal.....	54,512.11
Power canal.....	15,729.99
Appropriator's canal.....	383.22
	<hr/>
	896,768.92
<b>South side canal system:</b>	
South canal.....	151,706.10
Eastern canal.....	30,267.71
Consolidated canal.....	2,227.34
Tempe canal.....	115.90
	<hr/>
	184,317.05
<b>Well drilling: Mesa district, Battery A.....</b>	
	20,612.82
<b>Plant account:</b>	
Cement mill.....	8,293.69
Power line to mills.....	3,425.56
Miscellaneous plant buildings.....	\$447,992.83
Depreciation (credit).....	284,198.52
	<hr/>
	163,794.31
	<hr/>
	175,513.56
<b>Real estate (rights and property): Land purchased (not submerged).</b>	
	2,813.30
<b>Telephone system: Construction.....</b>	
	59,985.30



## Roads and highways (construction and maintenance):

Phoenix.....	\$352,703.11
High line.....	94,655.20
Tonto.....	70,232.92
Miscellaneous.....	14,143.80

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\$531,735.03

## Work done for Indian service (reimbursable).....

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10,840.93

## Examination of project as a whole:

Agua Fria, cement investigation.....	833.50
Underground water supply.....	15,658.86
Surveys.....	42,230.38
Investigation of Phoenix Valley.....	3,001.09
Hydrography.....	11,157.71

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72,881.54

## Inventory of unused supplies .....

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2,901.54

Total building cost as per debit in cost of work in statement of  
assets and liabilities.....

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7,441,625.84

**ARIZONA-CALIFORNIA**  
**COLORADO RIVER PROJECTS**  
**GENERAL STATEMENT**

The Colorado River projects consist of a number of possible irrigation developments on the lower Colorado River in Arizona and California, the principal of which are the Blythe, Parker, and Needles projects. Descriptions of the Colorado River projects are given in the first and second annual reports. The lands of these projects are to be irrigated with water from Colorado River, but there is an insufficient normal water supply in the river for their proper irrigation. The success of the projects depends, therefore, on the storage of water in the drainage areas of the Grand and Green river systems forming the Colorado River.

A description of the storage reservoirs investigated on Grand River and its tributaries will be found in the fourth annual report, and of those investigated on Green River previous to June 30, 1908, in the seventh annual report.

**BROWNS PARK RESERVOIR SITE**

Borings at the proposed dam site for the Browns Park reservoir have been continued during the fiscal year, but the work has been hampered by high water and by the difficulty, on account of the remoteness of site, of getting men to carry on the work.

**FINANCIAL STATUS**

*Assets and liabilities on June 30, 1909, Colorado River projects*

ASSETS		
Cost of work: Building cost .....		\$39,641.32
LIABILITIES		
Investment of the United States:		
Disbursement vouchers .....	\$35,527.37	
Transfer vouchers received .....	5,153.19	
	\$40,680.56	
Collection vouchers .....	760.32	
Transfer vouchers issued .....	278.92	
	1,039.24	
		39,641.32

*Feature costs to June 30, 1909, Colorado River projects*

Preliminary examination and surveys .....	\$39,641.32
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**YUMA PROJECT**

**LOCATION AND CLIMATIC CONDITIONS**

Counties: Yuma, Ariz.; Imperial, Cal.  
Townships: 3 to 13 S., Rs. 21 to 25 W., Gila and Salt River meridian; 9 to 17 S., Rs. 16 to 23 E., San Bernardino meridian.

Railroad: Southern Pacific.  
Railroad station: Yuma.  
Elevation of irrigable area: 100 to 300 feet above sea level.  
Average annual rainfall on irrigable area:  $2\frac{1}{2}$  inches.  
Range of temperature on irrigable area:  $22^{\circ}$  F. to  $118^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Colorado River.  
Area of drainage basin: 200,000 square miles.  
Average elevation of drainage basin: 4,000 feet above sea level.  
Average annual rainfall on drainage basin:  $12\frac{1}{2}$  inches.  
Average annual run-off of drainage basin: 11,000,000 acre-feet at Yuma.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: In connection with diversion dam—area, 6,400 acres; capacity, 25,600 acre-feet; length of spillway, 4,780 feet; elevation of spillway, 10 feet above stream bed.

Storage and diversion dam: Laguna—type, Indian weir; maximum height, 19 feet; length of masonry, 4,780 feet.

Length of canals: 32 miles with capacities greater than 300 second-feet; 25 miles with capacities less than 300 and greater than 50 second-feet; 100 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 800 feet.

Aggregate length of dikes: 388,080 feet.

Water power: Estimated total, 1,000 horsepower at drops in main canal.

Construction of project authorized: May 10, 1904.

Per cent completed: 70.5.

#### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 90,160 acres.

Ownership of irrigable lands (whole project): Public, 37,160 acres; private, 53,000 acres.

Lands irrigated, season of 1909: Private, 7,000 acres.

Character of soil of irrigable area: Rich alluvium.

Principal products: Semitropical fruits, alfalfa, grain.

Principal markets: Los Angeles and San Francisco, Cal.; Arizona towns; eastern markets for early produce.

#### GENERAL STATEMENT

A detailed description of the Yuma project may be found in the third annual report, and general descriptions of the project and of progress of work thereon are given in the other annual reports. Briefly, the present irrigation plan of this project provides for the diversion of water from Colorado River by Laguna dam, 10 miles northeast of Yuma, Ariz.; and, heading at the dam, two canal systems, one on either side of the river, serving lands in the Colorado and Gila River valleys in the vicinity of Yuma. The canal system heading on the California side conveys water to irrigable lands on that side of Colorado River, including those in the Yuma Indian Reservation, crosses Colorado River at Yuma by an inverted siphon, and serves the irrigable land in the Colorado River valley below Yuma on the east side of the river. The canal system heading on the Arizona side of Colorado River waters lands in the Colorado and the Gila River valleys lying east of Colorado River and north of Gila River. At the terminus of the gravity canal on the Arizona side, a pumping plant raises water through a small lift to irrigate 6,000 acres of land. Lands adjacent to the Gila and Colorado rivers are

protected from overflow of these streams by means of dikes. Laguna Dam and the dikes are completed and the construction of canals and structures on the Indian reservation is in progress.

#### LAGUNA DAM AND HEADWORKS

A complete description, with illustrations, of the original plans for Laguna dam and headworks is given in the third annual report, page 193. In conformity with changes in the plans adopted since that date, however, the main headworks have been constructed on the California side of the river instead of on the Arizona side. On January 24, 1907, the contract for constructing Laguna dam was assumed by the United States, by the mutual consent of the United States and the contractor. Since that date work has been conducted by forces under the direct supervision of engineers of the Reclamation Service, and the dam was completed in March, 1909. During the year under review the sluiceways at each end of the dam were completed, and, the river being diverted through the sluiceways during the period of low water, the portion of the dam lying across the channel of the river was finished. Toward the latter part of the time consumed in closing the channel the discharge of the river was about six times the average flow for the season of the year.

#### *Work done on Laguna dam to June 30, 1909*

Items.	By contractor.	By Reclamation Service.	Total.
<b>Material excavated:</b>			
Class 1.....cubic yards..	136,894	307,746	442,640
Class 2.....do.....	232,184	114,746	346,930
Rock placed in dam.....do.....	114,321	260,697	375,018
Rock pavement laid.....square yards.....	5,391		5,391
Concrete pavement laid.....cubic yards.....	952	36,598	37,550
Sheet piling, furnished and driven.....linear feet.....	50,003	32,776	82,779
Concrete core walls.....cubic yards.....	10,010	13,763	23,773
Foundation for lower wall.....linear feet.....		1,955	1,955

#### DIVERSION CANALS

The excavation of the main canal, heading at Laguna dam, was carried on with a steam shovel for a length of about 7,000 feet.

#### DIKES (LEVEES)

During the fiscal year about 2 miles of levee have been added to those in California on the Indian reservation south of the Southern Pacific Railroad, and several miles of levee between Yuma and Laguna dam, on which the Southern Pacific has maintained a railroad track, have been blanketed with material obtained near the dam. The levee work has been done by force account with teams and scrapers.

## PROGRESS OF SURVEYS

The subdivision of the Indian reservation into farm units and the preparation of farm-unit plats is well advanced. In February, March, and April, 1909, a survey party was collecting data between Laguna dam and Imperial Junction for a topographic map. For a portion of this work, covering land situated in Mexico over which it was necessary for the party to operate, concessions were obtained from the Republic of Mexico by the State Department.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal current contracts, Yuma project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1909.	Completion due.
71	Oct. 25, 1905	Pacific Portland Cement Co.	Cement.....	\$11,384.75	\$11,384.75	
221	Mar. 14, 1908	Fairbanks, Morse & Co.	Gas engines.....	5,050.00	5,025.50	May 15, 1908
223	Mar. 16, 1908	United Kansas Portland Cement Co.	Cement.....	12,000.00	12,741.29	Oct. 1, 1908
226	Mar. 11, 1908	General Electric Co....	Electrical apparatus.	2,415.00	1,783.00	July 3, 1908
258	Oct. 1, 1908	Iola Portland Cement Co.	Cement.....	6,000.00	6,320.00	June 1, 1909
273	Feb. 25, 1909	.....do.....	.....do.....		120.00	Dec. 1, 1909

## OPERATION

Pending the delivery of water from Laguna dam, the Reclamation Service continued operation of the irrigation systems purchased from the Colorado River Pumping and Irrigation Company, the Yuma Valley Union Land and Water Company (the Farmers' Gravity canal), and the Yuma Pumping Irrigation Company (the Rollins ditch). A steam pumping plant, with an average capacity of 40 second-feet, has been operated continuously, serving approximately 3,800 acres. A scoop-wheel, with a capacity of 80 second-feet, operated by producer-gas engines, has been installed and raises the total area of land that can now be irrigated to about 7,000 acres.

## SETTLEMENT AND AGRICULTURAL CONDITIONS

No land has been formally opened, and settlement has been confined to land watered from the pumping plants, approximately 250 water users being supplied with water.

A great variety of products are being raised, the principal crops being alfalfa, barley, pasture, garden truck, and fruit.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Yuma project*

## ASSETS

<b>Accounts receivable:</b>			
Uncollected water rentals.....		\$4,200.88	
Uncollected miscellaneous.....		115.66	
			<b>\$4,316.54</b>
<b>Inventories:</b>			
Mercantile store.....		9,327.69	
Government animals.....		17,151.00	
Equipment in use.....	\$212,256.24		
Less depreciation.....	20,972.69		
		191,283.65	
Storehouse.....		74,857.79	
Cement.....		3,052.08	
Iron and steel.....		5,943.69	
Lumber.....		2,851.44	
Forage.....		1,210.14	
Fuel.....		10,039.72	
Cash in office safe.....		963.75	
Unadjusted transfers.....		3,959.96	
Freight and handling undistributed.....		5,634.80	
			<b>326,275.71</b>
<b>Cost of work:</b>			
Building cost.....		3,225,425.33	
Less adjustments.....	42,868.95		
Less accrued revenues.....	45,938.36		
		88,807.31	
			<b>3,136,618.02</b>
<b>Total assets.....</b>			<b>3,467,210.27</b>

## LIABILITIES

<b>Investment of the United States:</b>			
Disbursement vouchers.....	3,347,602.83		
Transfer vouchers received.....	83,356.78		
		3,430,959.61	
Collection vouchers.....	94,397.49		
Transfer vouchers issued.....	3,751.64		
		98,149.13	
			<b>3,332,810.48</b>
<b>Accounts payable:</b>			
Unpaid labor.....		9,933.69	
Unpaid purchases.....		53,160.16	
Unpaid freight and express.....		70,311.15	
Unpaid passenger fares.....		143.29	
Unredeemed coupon books.....		583.00	
Unpaid miscellaneous.....		268.50	
			<b>134,399.79</b>
<b>Total liabilities.....</b>			<b>3,467,210.27</b>

*Feature costs to June 30, 1909, Yuma project*

<b>Laguna Dam:</b>			
Excavation, class 1.....	\$633,519.58		
Excavation, class 2.....	132,626.40		
Rock in dam.....	205,722.62		
Concrete core walls.....	174,466.47		
Rock paving.....	9,175.53		
Concrete paving.....	237,701.91		
Sheet piling for upper walls.....	38,557.31		
Sheeting for lower wall.....	3,434.90		
Clearing above dam.....	177.76		
Cofferdam.....	86,283.10		
River front protection.....	28,468.41		
Rock training dike.....	5,265.05		
Flood expense.....	55,434.52		
Diking and ditching at toe of dam.....	17,555.89		
Preliminary expense.....	5,537.77		
Clearing face of dam and raising cofferdam.....	6,860.68		
			<b>\$1,640,787.90</b>
<b>Sluice and regulator works:</b>			
Sluice-gate excavation.....		519.44	
Sluice gates, piers, and abutments.....		53,405.72	
Sluice and regulating gates (installing).....		76,692.25	
Sluiceway walls (lining and paving).....		80,562.15	

## Sluice and regulator works—Continued.

Sluiceway paving.....	\$21,709.91	
Concrete bridge over sluiceway.....	10,124.76	
Canal heading walls and lining.....	10,082.55	
Sluiceway excavation.....	26,387.52	
Power house.....	142.34	
		<hr/>
		\$279,626.64

## Canals:

Reservation canal construction, excavation, structures and bridges.....	187,162.81	
Arizona main canal.....	23,145.98	
Yuma main canal.....	36,543.16	
		<hr/>
		246,851.95

## Levees:

Gila Valley.....	63,053.47	
Yuma Valley.....	229,834.97	
Reservation.....	249,297.89	
		<hr/>
		542,186.33

## Pumping plants with canal system:

Steam pumping plant and canal.....	41,580.90	
Gravity plant and canal.....	66,793.17	
		<hr/>
		108,374.07

## Real estate, lands purchased.....

72,585.19

## Examination of project as a whole:

Preliminary surveys previous to selection of project.....	174,735.85	
Subdivision of reservation, engineering.....	5,745.32	
Colorado River investigations.....	5,921.14	
Gila Valley topography.....	4,861.65	
Colorado siphon, boring and testing.....	2,375.35	
		<hr/>
		193,639.31

## Administration of project as a whole:

General expense prior to 1907.....	90,684.70	
General expense since 1907.....	50,422.94	
Expense of convention.....	266.30	
		<hr/>
		141,373.94

Total building cost as per debit in cost of work in statement of assets and liabilities..... 3,225,425.33

## CALIFORNIA

### ORLAND PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: California.

Counties: Glenn and Tehama.

Townships: 21 to 23 N., Rs. 2 to 4 W., Mount Diablo meridian.

Railroad: Southern Pacific.

Railroad stations: Orland, Greenwood, and Malton, California.

Average elevation of irrigable area: 225 feet above sea level.

Average annual rainfall on irrigable area: 17 inches.

Range of temperature on irrigable area: 24° F. to 120° F.

#### WATER SUPPLY

Source of water supply: Stony Creek.

Area of drainage basin above diversion dam: 790 square miles.

Area of drainage basin above East Park dam: 102 square miles.

Average annual rainfall on drainage basin: 25 inches.

Average annual run-off of drainage basin: 541,000 acre-feet near Fruto; 65,000 acre-feet at storage dam.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: East Park—area, 1,800 acres; capacity, 45,000 acre-feet; length of spillway, 415 feet; elevation of spillway, 85 feet above stream bed.

Storage dam: East Park—type, concrete gravity section; maximum height, 139 feet; length of crest, 220 feet; contents, 13,000 cubic yards.

Diversion dams: For south side canal—type, sheet piling capped with concrete; length, 900 feet. For north side canal—not designed.

Length of canals: No canals with capacities greater than 300 second-feet; 20 miles with capacities less than 300 and greater than 50 second-feet; 75 miles with capacities less than 50 second-feet.

Construction of project authorized: October 5, 1907.

Per cent completed: 35.

#### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 14,000 acres.

Ownership of irrigable lands (whole project): Public, 200 acres; private, 13,800 acres.

Land irrigated, season of 1909: Private, 800 acres.

Character of soil of irrigable area: Sandy and gravelly loam.

Principal products: Alfalfa, fruits, almonds, vegetables.

Principal markets: San Francisco, Cal., and vicinity.

#### GENERAL STATEMENT

A detailed description of the Orland project may be found in the sixth annual report, and a general description of the project and of the progress of work thereon is given in the seventh annual report. Briefly, the irrigation plan of the project contemplates the construction of a storage reservoir controlled by East Park dam on Stony Creek at a point about 40 miles above Orland, Cal., and a diversion dam at



Miller Buttes, and the utilization and enlargement of two canal systems, one on either side of the creek, watering lands in the vicinity of Orland. The present limits of the Orland project may be considered as a unit of the Sacramento Valley project. It may be expanded by constructing additional reservoirs on Stony Creek and its tributaries. The chief additional reservoir sites available are Millsite, on Stony Creek, near Fruto; Briscoe, on Briscoe Creek, near Elk Creek; and Stonyford, on Stony Creek, at Stonyford. Only reconnaissance surveys of these sites have been made, but it is proposed to make investigation of the entire drainage basin of Stony Creek during the present season. The canal system of the Stony Creek Irrigation Company has been purchased, and negotiations have been completed for the purchase of the canal system of the Lemon Home Company. The construction of the East Park dam and of the diversion dam at Miller Buttes has been commenced.

#### EAST PARK DAM

East Park reservoir is located on Little Stony Creek at Lodoga. On August 27, 1908, a contract for building the storage dam and spillway required for this reservoir was awarded, and in November the contractor commenced hauling cement and opening a quarry for sandstone blocks to be embedded in the concrete of the dam. Work was suspended during the winter on account of high water in Little Stony Creek and on account of the poor condition of the roads to the dam site. Work was resumed in May, 1909, and on June 30 the contractor had hauled his plant to the site of the work, constructed a flume and cofferdam, and started excavation for the foundation of the dam.

#### DIVERSION CANALS

A new heading and new sluiceways have been built, and the construction of a diversion dam has been commenced at Miller Buttes for the south side canal system, which will consist of the canals purchased from the Stony Creek Irrigation Company, together with future enlargements and extensions. The canal system of the Lemon Home Company will be purchased and with enlargements and extensions will form the north side system of the project, and plans are being developed for building a new heading therefor, the location and nature of which has not been determined. In the meantime this system, after its purchase, can be operated by building a temporary earth and gravel dam and regulating the flow by means of the present wooden head-gates of Lemon Home canal.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Orland project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
71	Oct. 25, 1905	Pacific Portland Cement Co.	Cement.....	\$600. 70	\$600. 70	
140	Oct. 15, 1906	.....do.....	.....do.....	276. 00	276. 00	June 1, 1908
231	Apr. 2, 1908	Western Building Material Co.	.....do.....	2,000. 00	1,422. 30	Oct. 1, 1908
257	Oct. 5, 1908	Stanley Contracting Co.	East Park dam.....	79,881. 65	1,389. 36	July 1, 1910

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Orland project*

## ASSETS

<b>Inventories:</b>			
Mercantile store.....		\$8. 51	
Government animals.....		525. 00	
Equipment in use.....		7,572. 81	
Storehouse.....		705. 92	
Cement.....		1,563. 25	
Lumber.....		387. 35	
Explosives.....		72. 94	
Unadjusted transfers.....		835. 99	
			<b>\$11,671. 77</b>
<b>Cost of work:</b>			
Building cost.....		196,321. 84	
Less adjustments.....		\$386. 51	
Less accrued revenues.....		2,036. 47	
		2,422. 98	
			<b>193,898. 86</b>
<b>Total assets.....</b>			<b>205,570. 63</b>

## LIABILITIES

<b>Investment of the United States:</b>			
Disbursement vouchers.....	169,775. 71		
Transfer vouchers received.....	17,606. 87		
		187,382. 58	
Collection vouchers.....	2,397. 46		
Transfer vouchers issued.....	981. 80		
		3,379. 26	
			<b>184,002. 32</b>
<b>Accounts payable:</b>			
Unpaid labor.....		514. 50	
Unpaid purchases.....		1,024. 16	
Unpaid contract estimates.....		1,250. 42	
Unpaid contract holdbacks.....		138. 94	
Unpaid freight and express.....		576. 96	
Unpaid passenger fares.....		432. 33	
Unpaid land agreements.....		17,630. 00	
			<b>21,567. 31</b>
<b>Total liabilities.....</b>			<b>205,570. 63</b>

*Feature costs to June 30, 1909, Orland project*

<b>Storage works:</b>			
East Park dam.....	\$85,555. 77		
Stonyford reservoir.....	128. 28		
Millsite reservoir.....	328. 21		
			<b>\$86,012. 26</b>

Diversion system: Dam and headworks, south canal.....		\$13,351.58
Canal system:		
North main.....	\$19,661.14	
South main.....	36,051.19	
Malton branch.....	21.71	
Central branch.....	1.15	
Wyoming branch.....	343.97	
Stony Creek branch.....	55.47	
Middle branch.....	2.50	
Orland branch.....	128.32	
Mecum branch.....	495.64	
		56,761.09
Lateral system:		
South main canal.....	11.10	
Malton branch canal.....	4.30	
Stony Creek branch canal.....	2.50	
Orland branch canal.....	1.30	
		19.20
Buildings:		
Office.....	2,504.87	
Cottage.....	2,224.04	
Tank house.....	672.36	
Storehouse.....	689.10	
Barn.....	505.33	
Headquarters grounds.....	1,866.23	
Minor buildings, storehouses, sheds, etc.....	92.25	
		8,554.18
Administration of project as a whole:		
General expense.....	28,574.55	
Headquarters corral.....	638.52	
		29,213.07
Experiment farms:		
Cultivation.....	2,072.29	
Power line, construction.....	247.02	
		2,319.31
Inventory of unused supplies.....		91.15
Total building cost as per debit in cost of work in statement of assets and liabilities.....		196,321.84

### SACRAMENTO VALLEY INVESTIGATIONS

Early in May, 1909, a party was organized to prosecute investigations in the Sacramento Valley to determine irrigation possibilities. The work will include the collection of information relating to hydrography, water rights, existing irrigation and power systems, the character, location, and ownership of irrigable lands, and the examination of available reservoir sites. Data and information accumulated by the Reclamation Service, Geological Survey, and other organizations have been classified and will be utilized as far as possible. A reconnaissance of the northern part of Sacramento Valley has been commenced and it is expected that this investigation will be completed during the fall of 1909.

## COLORADO

### GRAND VALLEY PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: Colorado.

County: Mesa.

Townships: 1 N., Rs. 1 E. and 1 and 2 W.; 2 N., Rs. 2 and 3 W.; 1 S., Rs. 1 E. and 1 W.; Ute meridian. 9 S., Rs. 103 and 104 W.; 10 S., Rs. 98 to 101 and 103 W.; 11 S., Rs. 98 and 99 W., sixth principal meridian.

Railroads: Denver and Rio Grande; Colorado Midland.

Railroad stations: Palisade, Clifton, Grand Junction, Fruita, Loma, and Mack, Colo.

Average elevation of irrigable area: 4,700 feet above sea level.

Average annual rainfall on irrigable area: 8 inches.

Range of temperature on irrigable area:  $-15^{\circ}$  F. to  $100^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Grand River.

Area of drainage basin: 8,550 square miles.

Average elevation of drainage basin: 9,200 feet above sea level.

Average annual rainfall on drainage basin:  $15\frac{1}{4}$  inches.

Average annual run-off of drainage basin: 3,671,000 acre-feet.

#### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 53,000 acres.

Ownership of irrigable lands (whole project): Public, 35,000 acres; private, 18,000 acres.

Character of soil of irrigable area: Sandy loam, sandy mesas, and adobe.

Principal products: Fruit, sugar beets, alfalfa.

Principal markets: Large cities east of Rocky Mountains for fruit; other products, local.

#### GENERAL STATEMENT<sup>a</sup>

A detailed description of the Grand Valley project is given in the second annual report<sup>a</sup> and general descriptions of the project are given in the other annual reports. Briefly, the irrigation plan of the project contemplates the construction of a diversion dam on Grand River about 6 miles northeast of Palisade, Colo., and a canal system heading at this diversion dam and located on the north side of Grand River. The first 6 miles of canal line is in a canyon and involves a large amount of sidehill work and tunnel construction. From Palisade the canal will follow a general northwesterly direction and will irrigate approximately 53,000 acres of land lying north and west of Grand Junction, Fruita, and Mack, Colo.

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<sup>a</sup> Statements made in the Second Annual Report, on page 224, concerning the relations of Mr. T. C. Henry to the canal systems in the vicinity of the Grand Junction have been questioned. They were not essential to the discussion regarding the proposed Grand Valley project and are therefore withdrawn.

During the fiscal year the topographic mapping of the irrigable area was completed. Thirty-two miles of the main canal have been located and part of it has been cross-sectioned ready for construction. A large number of the principal structures have been designed. Surveys have been completed for rights of way needed over cultivated lands. Estimates have been prepared for important alternate plans of development and the estimates for the entire project have been revised.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Grand Valley project*

ASSETS		
Inventories:		
Government animals.....	\$277.00	
Equipment in use.....	1,577.83	
Storehouse.....	1,660.20	
Lumber.....	1,757.96	
Forage.....	124.83	
Unadjusted transfers.....	107.25	
		\$5,505.16
Cost of work:		
Building cost.....	48,028.42	
Plus adjustments.....	234.92	
		48,263.34
Total assets.....		53,768.50
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	\$40,798.59	
Transfer vouchers received.....	52,280.77	
		55,079.36
Collection vouchers.....	20.54	
Transfer vouchers issued.....	2,560.05	
		2,580.59
		52,498.77
Accounts payable:		
Unpaid labor.....	866.02	
Unpaid purchases.....	214.28	
Unpaid freight and express.....	144.68	
Unpaid passenger fares.....	44.75	
		1,269.73
Total liabilities.....		53,768.50

*Feature costs to June 30, 1909, Grand Valley project*

Examination of project as a whole: Preliminary surveys.....	\$26,160.00
Administration of project as a whole: General expense.....	21,358.40
Irrigable lands: Farm-unit subdivision and soil examination.....	510.02

Total building cost, as per debit in cost of work in statement of assets and liabilities..... 48,028.42

## UNCOMPAHGRE VALLEY PROJECT

## LOCATION AND CLIMATIC CONDITIONS

State: Colorado.  
 Counties: Montrose and Delta.  
 Townships: 15 S., Rs. 94 to 96 W., sixth principal meridian; 48 to 51 N., Rs. 7 to 12 W., New Mexico meridian.  
 Railroad: Denver and Rio Grande.  
 Railroad stations: Montrose, Olathe, and Delta, Colo.  
 Average elevation of irrigable area: 6,000 feet above sea level.  
 Average annual rainfall on irrigable area: 9 inches.  
 Range of temperature on irrigable area: -20° F. to 98° F.

## WATER SUPPLY

Sources of water supply: Gunnison and Uncompahgre rivers.  
Area of drainage basin: 3,850 square miles.  
Average elevation of drainage basin: 10,000 feet above sea level.  
Average annual rainfall on drainage basin: 15 inches.  
Average annual run-off of drainage basin: 1,500,000 acre-feet.

## ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Taylor Park—area, 2,260 acres; capacity, 106,000 acre-feet; length of spillway, 125 feet; elevation of spillway, 150 feet above stream bed.  
Storage dam: Taylor Park—type, arched masonry; maximum height, 200 feet; length of crest, 700 feet; contents, 212,000 cubic yards.  
Diversion dams: Five; type and design not determined.  
Length of canals: 30 miles with capacities greater than 300 second-feet; 100 miles with capacities less than 300 and greater than 50 second-feet; 200 miles with capacities less than 50 second-feet.  
Aggregate length of tunnels: 35,000 feet.  
Water power: Estimated total, 10,000 horsepower.  
Construction of project authorized: March 14, 1903.  
Per cent completed: 51.6.

## AGRICULTURAL CONDITIONS

Irrigable area (whole project): 140,000 acres.  
Ownership of irrigable lands (whole project): Public, 36,000 acres; private, 104,000 acres.  
Lands irrigated, season of 1909: Public, 1,000 acres; private, 15,600 acres.  
Character of soil of irrigable area: Red sandy gravel, adobe, and clay loam.  
Principal products: Alfalfa, grain, fruits, sugar beets, vegetables.  
Principal markets: Denver, Colo.; Chicago, Ill.; local mining camps.

## GENERAL STATEMENT

The Uncompahgre Valley project was described in detail in the fifth annual report, and general descriptions of the project and of the progress of work thereon have appeared in other annual reports. The plan of the project is to divert water from the canyon of Gunnison River by means of a 6-mile tunnel (Gunnison) to supplement the flow of Uncompahgre River in the irrigation of lands in Uncompahgre Valley. To distribute the waters of Uncompahgre and Gunnison rivers, thus combined, the Government proposes to acquire and utilize some of the private ditches taking water from Uncompahgre River, and to supplement them by building a high-line canal on either side of the valley (West canal and East canal), both diverting from Uncompahgre River, and by constructing a canal (South canal) for carrying water from Gunnison tunnel to Uncompahgre River and incidentally for irrigating adjacent lands in Uncompahgre Valley. The Montrose and Delta canal and Loutsenhizer canal have been acquired and negotiations are pending between the water users' association and the owners of other ditches. Gunnison tunnel is under construction and South canal is practically completed. East and West canals are to be constructed.

## GUNNISON TUNNEL

Work on Gunnison tunnel has been continued by force account, and at the end of the fiscal year the excavation of the undercut drifts in the two headings had progressed to within 60 feet of meeting. In

the east heading subterranean water courses and reservoirs encountered in the progress of excavation caused delay and additional expense in conducting the work. Early in the fiscal year a new pump and a new discharge pipe 12 inches in diameter were installed, but the capacities of the pumps, electrical power plant, and discharge pipes were so severely taxed that little excavation could be made until December 27, after which date the work was continued without interruption. The water pumped from the heading increased each month from July to December, when it reached a maximum of 2.2 second-feet. It has since gradually diminished, until at the end of the fiscal year it was 1.7 second-feet. The material encountered in this heading has been granite and gneiss with occasional seams of disintegrated talc.

Satisfactory progress has in general been made in the west heading during the year. On July 30, 1908, a cloudburst raised the waters of Cedar Creek until they broke into the portal cut and delayed tunnel excavation for nearly a month by filling the cut with débris and washing out about 55 feet of timbering at the end of the tunnel. The average flow of water from the heading increased gradually from 7.6 second-feet in July, 1908, to 10 second-feet in December, and then steadily diminished to 5.5 second-feet in June, 1909.

The placing of concrete lining in the east heading was commenced in November, 1908, and all of the timbered full section and the connection to the headworks have been lined. In the west heading the placing of concrete was resumed in September, and on June 30 all but 468 feet of the timbered full section had been lined, the concrete portal had been built, and 300 feet of lining had been placed in the portal cut.

The excavation for the headworks at the river portal was completed during the winter, the tunnel crews being employed thereon during the time that work in the heading was suspended. All of the concrete for this portal has been placed and the gates and hoists are at the site ready for installation.

The future work on the tunnel and its approaches will consist in lining the remainder of the west portal cut, building the Cedar Creek wasteway, and enlarging the 10,019 linear feet of undercut drift to full tunnel section. Through unstable material the tunnel will be lined with concrete as soon as enlarged.

The progress of work on the tunnel is indicated by the following table:

*Progress of excavation, Gunnison tunnel*

	Total, June 30, 1908.		Progress during year ending June 30, 1909.		Total, June 30, 1909.	
	East end.	West end.	East end.	West end.	East end.	West end.
Tunnel excavation:	<i>Lin. ft.</i>	<i>Lin. ft.</i>	<i>Lin. ft.</i>	<i>Lin. ft.</i>	<i>Lin. ft.</i>	<i>Lin. ft.</i>
Full section, 11 by 12 feet.	6,996	13,546	84	-----	7,080	13,546
Undercut drift, 11 by 8½ feet.	2,390	2,757	1,347	3,431	3,737	6,188
Concrete lining:						
Floor.		13,452	863	-----	863	13,452
Side walls and arch.		8,414	522	5,172	522	13,586
Timbering.	373	13,365	394	454	767	13,819

## SOUTH CANAL

Except during freezing weather the outflow of water from the west heading of Gunnison tunnel has been impounded in South canal to season and test the banks. On division 18 a relocated section of the canal and a tunnel 400 feet long have been excavated, and preparations have been completed for placing concrete lining therein. The outlet works at Uncompahgre River are practically completed. The work on division 18 will be completed as soon as possible and a chute at the head of division 10 will be built.

## WEST CANAL

A final location survey for the first 6 miles of West canal was made in the spring of 1909. Proposals for this work were invited by the water users' association but none were received. No actual construction work on this canal has been undertaken.

## PRINCIPAL CURRENT CONTRACT

The following statement contains data relating to the principal contract in operation during the fiscal year ending June 30, 1909:

No. 282; date, March 2, 1909; contractor, Colorado Portland Cement Company, for cement; estimated value, \$11,800; estimated earnings, June 30, 1909, \$9,174.40; completion due, December 1, 1909.

## SETTLEMENT

Since construction work was begun on the project the area of lands settled has been greatly in excess of that for which water has been available. Large tracts planted to fruit, or well adapted to intensive cultivation, have been subdivided and sold, and thus many new settlers have been given an opportunity to establish comfortable homes in the valley. The sales of land on the project consist mainly in transfers of small tracts. All public land was withdrawn from entry on July 28, 1908. The unentered public land that can be thrown open at the completion of the project comprises approximately 28,000 acres, containing 15,000 acres of irrigable land which can be divided into nearly 200 farm units.

## OPERATION AND MAINTENANCE

The operation of the Montrose and Delta canal and Loutsenhizer canal has been continued by the Reclamation Service. Both canals were thoroughly cleaned in the fall of 1908 and at the same time the first mile of the Montrose and Delta canal was enlarged to double its former capacity. The operation of the canals has been continuous throughout the irrigation season except for a few days' interruption in July and August, 1908, required for repairing damages caused by cloudbursts. For the season of 1909 water is being supplied for 360 different tracts of land to 336 water users. In 1908 about 14,600 acres and for the season of 1909 about 16,600 acres were irrigated under Montrose and Delta and Loutsenhizer canals.



## AGRICULTURAL RESULTS

In the table below are shown for the principal irrigated crops grown within the project, including lands watered by private canals as well as those watered by canals owned and operated by the service, estimates of the acreage, yield per acre, total market value, and market value per acre.

*Crop results, Uncompahgre Valley project*

Crops.	Acreage.	Estimated yield per acre.	Estimated market value.	
			Total.	Per acre.
Alfalfa.....	21,200	4 tons.....	\$500,000	\$23.50
Oats.....	6,200	2,200 pounds.....	200,000	32.40
Orchard fruits.....	a 4,000	150 boxes.....	450,000	112.50
Wheat.....	3,200	1,800 pounds.....	80,000	25.00
Beets.....	2,600	15 tons.....	185,000	74.50
Potatoes.....	1,500	10,000 pounds.....	120,000	80.00
Garden truck.....	300		60,000	200.00
Total and average.....	39,000		1,595,000	40.90

a 700 acres young trees not in bearing.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Uncompahgre Valley project*

## ASSETS

Inventories:			
Mercantile store.....		\$14,687.13	
Government animals.....		1,008.50	
Equipment in use.....		78.15	
Storehouse.....		17,077.78	
Cement.....		12,430.76	
Lumber.....		2,212.86	
Explosives.....		3,170.18	
Forage.....		2,509.86	
Fuel.....		4,702.98	
Cash in office safe.....		1,248.10	
Unadjusted transfers.....		1,284.31	
			\$60,410.61
Cost of work:			
Building cost.....		3,675,236.01	
Less adjustments.....	\$8,222.54		
Less accrued revenues.....	59,990.47		
		68,213.01	
			3,607,023.00
Total assets.....			3,667,433.61

## LIABILITIES

Investment of the United States:			
Disbursement vouchers.....	3,633,117.99		
Transfer vouchers received.....	72,174.20		
		3,705,292.19	
Collection vouchers.....	103,105.05		
Transfer vouchers issued.....	3,589.44		
		106,694.49	
			3,598,597.70
Accounts payable:			
Unpaid labor.....		26,272.70	
Unpaid purchases.....		14,566.57	
Unpaid contract holdbacks.....		1,750.00	
Unpaid freight and express.....		25,590.18	
Unpaid passenger fares.....		207.21	
Unredeemed coupon books.....		441.70	
Unpaid miscellaneous.....		7.55	
			68,835.91
Total liabilities.....			3,667,433.61

*Feature costs to June 30, 1909, Uncompahgre Valley project*

Storage: Preliminary examination Taylor Park dam.....		\$466. 81
Cimarron lateral: Topography.....		1, 209. 38
Gunnison tunnel:		
Headworks—head gates, excavation, and concrete..	\$19, 644. 03	
River portal heading.....	828, 619. 90	
West portal heading.....	1, 471, 581. 34	
Portal cut excavation.....	96, 620. 90	
Tunnel road.....	35, 860. 11	
Engineering.....	58, 085. 66	
		2, 510, 411. 94
Canal system:		
South canal.....	728, 196. 30	
West canal.....	14, 544. 42	
East canal.....	8, 809. 57	
Purchase of existing canal systems (outstanding water rights and real estate).....	136, 745. 81	
		888, 296. 10
Preliminary operation of canals:		
General expense.....	3, 577. 16	
Earthwork.....	12, 732. 49	
Structures.....	1, 450. 49	
Distribution.....	4, 516. 87	
Protection.....	482. 51	
		22, 759. 52
Buildings: Montrose office.....		10, 575. 54
Telephone system construction.....		5, 961. 94
Preliminary topography: Surveys.....		64, 609. 88
Irrigable lands: Farm-unit subdivision and soil examination .....		3, 080. 23
Examination of project as a whole: Expert engineering, hydrography, geology, lateral investigation, reconnaissance, etc.....		21, 752. 84
Administration of project as a whole:		
General expense.....	\$115, 697. 24	
Montrose office expense.....	30, 154. 42	
		145, 851. 66
Power development: Surveys.....		260. 17
Total building cost as per debit in cost of work in statement of assets and liabilities.....		3, 675, 236. 01

## IDAHO

## DUBOIS PROJECT

A detailed description of the Dubois project is given in the fourth and fifth annual reports. The work done on the project during the fiscal year has consisted mainly in the gaging of streams and general investigations. The total expenditures to June 30, 1909, amount to \$477.74.

## MINIDOKA PROJECT

## LOCATION AND CLIMATIC CONDITIONS

State: Idaho.

Counties: Lincoln and Cassia.

Townships: 8 to 11 S., Rs. 22 to 25 E., Boise meridian.

Railroads: Minidoka and Southwestern; Oregon Short Line.

Railroad stations: Acequia, Rupert, Heyburn, and Burley, Idaho.

Average elevation of irrigable area: 4,200 feet above sea level.

Average annual rainfall on irrigable area: 14 inches.

Range of temperature on irrigable area:  $-2^{\circ}$  F. to  $98^{\circ}$  F.

## WATER SUPPLY

Source of water supply: Snake River supplemented by storage. (See Snake River storage.)

Area of drainage basin: 17,900 square miles.

Average elevation of drainage basin: 6,000 feet above sea level.

Average annual rainfall on drainage basin: 21 inches.

Average annual run-off of drainage basin: 8,000,000 acre feet.

## ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Lake Walcott—area, 15,000 acres; capacity, 140,000 acre-feet; length of spillway, 2,385 feet; elevation of fixed crest of spillway, 42 feet above stream bed.

Storage and diversion dam: Minidoka—type, rockfill with concrete regulating works; maximum height, 75 feet; length of masonry, 176 feet; length of rockfill, 550 feet.

Length of canals: 31 miles with capacities greater than 300 second-feet; 111 miles with capacities less than 300 and greater than 50 second-feet; 252 miles with capacities less than 50 second-feet.

Water power: 1,800 horsepower developed; estimated total, 7,200 horsepower.

Construction of project authorized: April 23, 1904.

Per cent completed: Gravity unit, 100; pumping unit, 56.

## AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 132,031 acres; gravity unit, 82,125 acres; pumping unit, 49,906 acres.

Ownership of irrigable lands (whole project): Public, 107,711 acres; State, 21,141 acres; private, 3,179 acres.

Lands irrigated, season of 1909: 43,500 acres.

Character of soil of irrigable area: Clay, sandy loam and loose sandy soil.

Duty of water: 3 acre-feet per acre per annum at the farm.

Principal products: Hay, wheat, oats, sugar beets, potatoes, small fruits.

Principal markets: Pocatello, Idaho; Salt Lake, Utah; Butte and Helena, Mont.

## LANDS OPENED FOR IRRIGATION

Dates of public notices and orders relating thereto: Public notices, March 9, 1907; November 23, 1908; February 11, 1909; March 30, 1909. Orders, July 19, 1907; December 10, 1907; July 9, 1908.

Location of lands opened: Townships 8 and 10 S., Rs. 22 and 25 E., Boise meridian.

Irrigable area opened: Public, 74,935 acres; State, 6,204 acres; private, 287 acres.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: \$22 and \$30.

Annual maintenance and operation charge: \$0.60 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Minidoka project may be found in the fifth annual report and general descriptions of the project and of the progress of work thereon are given in the other annual reports. Briefly, the irrigation plan of this project provides for the diversion of the waters of Snake River for the irrigation by gravity and pumping of lands lying north and south of the river in Lincoln and Cassia counties. A combined storage, diversion, and power dam has been constructed across Snake River about 6 miles south of Minidoka, Idaho. Two canal systems, one on either side of the river, head at the diversion dam and water lands in the vicinity of Acequia, Rupert, and Heyburn, Idaho. Power developed at the dam is being utilized in pumping from the canal on the south side of the river for the irrigation of high lands, but the power and pumping plants and the canals for distributing pumped water have not been completed. Storage for the project will be provided mainly by a reservoir or reservoirs to be constructed in the upper drainage basin of Snake River. (See Snake River storage.)

## PUMPING SYSTEM

During the latter part of 1908 and the early part of 1909 the construction of the power house and pumping stations on the south side system was expedited to provide for delivery of water in the season of 1909. Concrete work was carried on through very cold weather with the use of artificial heat. The structures were built up to the main machinery floor, and the machinery required for this year's irrigation has been installed. The machinery installed at the power house consists of one 1,800-horsepower turbine and generator, one 140-horsepower turbine with exciter, and a transformer. At each of pumping stations 1 and 2 one 125-second-foot centrifugal pump and a 600-horsepower motor were installed. At pumping station 3 a 75-second-foot centrifugal pump and a 300-horsepower motor were installed. Sixteen miles of transmission line were built. A duplicate of the equipment in power and pumping stations will be installed next fall and winter. Temporary wooden structures were built over the machinery, and on June 15, 1909, work on the permanent concrete superstructures of the power and pump houses was begun. A tailrace channel 80 feet wide on the bottom and 500 feet long, with cuts from 3 feet to 20 feet, was made in the rock bed of the river below the power house. During the fall of 1908 and spring of 1909 a portion of the sublateral system sufficient to furnish water to those ready for it in the season of 1909 was constructed. The excavating was done under small informal contracts and the structures were built by force account.

## SOUTH SIDE GRAVITY CANAL

The south side gravity canal, which irrigates 8,200 acres of land by gravity and is the feeder canal for the pumping system, was designed to be 46 feet wide on the bottom and to carry 6 feet in depth of water. At the time of the construction of the gravity unit the canal was excavated 20 feet wide on the bottom and to carry 3 feet in depth of water. A portion of the necessary enlargement was made during the fiscal year, and this work will be continued in the fall of 1909.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Minidoka project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
17	Sept. 17, 1904	Bates & Rogers Construction Co.	Dam, diversion channel, spillway, and canal.	\$486,423.00	α \$443,880.63	Sept. 30, 1906
55	July 8, 1905	Monarch & Porter...	Canals and structures.	194,826.75	185,047.11	Aug. 21, 1906
101	May 4, 1906	Illinois Steel Co.....	Cement.....	4,977.50	α 4,977.50	
217	Dec. 27, 1907	Weber Gas Engine Co.	Gas engines.....	8,100.00	α 8,100.00	Feb. 2, 1908
237	May 14, 1906	Portland Cement Co.	Cement.....	2,000.00	2,860.23	Oct. 1, 1908
230	Apr. 1, 1906	Allis-Chalmers Co....	Electrical apparatus.	39,710.00	10,870.00	Jan. 4, 1909
247	Aug. 5, 1908	do.....	Turbines and pumps	189,127.00	25,676.00	Feb. 3, 1909
248	do.....	Westinghouse Electrical and Manufacturing Co.	Electrical apparatus.	113,892.35	42,232.25	Jan. 29, 1909
250	Aug. 12, 1908	Iola Portland Cement Co.	Cement.....		106.80	June 1, 1909
259	Oct. 30, 1908	Niles-Bement Pond Co.	Cranes.....	3,643.50	3,643.50	Feb. 19, 1909
265	Dec. 22, 1908	Fulton Engine Works.	Gates.....	10,994.00	5,701.00	Mar. 25, 1909
279	Feb. 26, 1909	Standard Underground Cable Co.	Copper wire.....	3,943.63	α 3,962.70	Apr. 1, 1909
281	Mar. 17, 1909	Colorado Portland Cement Co.	Cement.....	14,854.42	3,085.43	Dec. 1, 1909

α Completed.

## ORDER DATED JULY 19, 1907

In view of the fact that certain areas within the Minidoka project, Idaho, are above the grade of the gravity distribution of the water supply, it is hereby ordered that wherever any farm unit contains an area in excess of 3 acres above the grade of gravity distribution, the time for the beginning of payment of the building charges and the operation and maintenance charges for such high areas is hereby fixed for the irrigation season of 1910, the same becoming due and payable in the same manner as other charges under the project on or before December 1, 1910: Provided, that if the United States shall install facilities for pumping water from the canals to the higher lands at any time prior to the irrigation season of 1910, the payments of the charges for building, operation, and maintenance shall begin at such time as these pumping facilities shall be available for raising water for irrigation purposes, as hereafter announced.

An appropriate charge for building, operation, and maintenance for these high areas will be made in addition to the charges under the project for the gravity system, except for such areas as by grading are made available for irrigation by gravity.

The acreage subject to the charges under the gravity system as announced by departmental order of March 9, 1907, will be determined by the officers of the Reclamation Service and will be announced prior to December 1, 1907.

The order of March 9, 1907, as to the payment of charges shall be effective as to the areas under the gravity distribution system as heretofore announced.

## ORDER DATED DECEMBER 10, 1907

In pursuance of the public notice issued under the provisions of the reclamation act, for the Minidoka project, Idaho, under date of March 8, 1907, it is hereby ordered:

1. That such part of the charge for the project as has been fixed for operation and maintenance, namely, 40 cents per acre, may be paid independently of the building charge.

2. In pursuance of the authority contained in section 10 of the reclamation act for the establishment of rules and regulations necessary and proper for the purpose of carrying the provisions of the act into full force and effect, the following rule is

promulgated for said project: That all charges due for operation and maintenance must be paid for all the irrigable land included in any water-right application on or before April 1 of each year, in default of which no water will be furnished for the irrigation of such lands.

ORDER DATED JULY 9, 1908

The clause designated (1) of the public notice issued under the provisions of the reclamation act for the Minidoka project, Idaho, under date of March 9, 1907, is hereby amended to read as follows:

1. The building of the irrigation system, \$22 per acre, payable in not more than 10 annual installments, each not less than \$2.20 per acre; provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

PUBLIC NOTICE DATED NOVEMBER 23, 1908

The public notice issued March 9, 1907, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), for the Minidoka project, Idaho, provides that the charges per acre for lands which can be irrigated by the waters of said project are divided into two parts; that the part for operation and maintenance for the irrigation season of 1907 will be 40 cents per acre of irrigable land, and that the operation and maintenance charge for subsequent years shall be of the amount as announced by the Secretary of the Interior each year.

In pursuance of the terms of said notice and of the said act of Congress, it is hereby announced that the portion of the 1908 installment, on account of operation and maintenance, to become due December 1, 1908, shall be 40 cents per acre of irrigable land. In accordance with order issued December 10, 1907, payment of the portion of the installment for operation and maintenance due on December 1 of each year must be made on or before April 1 of the following year, in default of which no water will be furnished for the irrigation of such land.

This notice was signed and referred to the Commissioner of the General Land Office for transmission to the register and receiver of the local land office at Hailey, Idaho, with appropriate instructions for putting into effect the provisions thereof and for its publication in local newspapers.

PUBLIC NOTICE DATED FEBRUARY 11, 1909

The public notice issued March 9, 1907, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), for the Minidoka project, Idaho, provides that the charges per acre for lands which can be irrigated by the waters of said project are divided into two parts; that the part for operation and maintenance for the irrigation season of 1907 will be 40 cents per acre of irrigable land, and that the operation and maintenance charge for subsequent years shall be of the amount as announced by the Secretary of the Interior each year.

In pursuance of the terms of said notice and of the said act of Congress, it is hereby announced that the portion of the installment on account of operation and maintenance to become due December 1, 1909, shall be 60 cents per acre of irrigable land, and the said rate shall remain in effect for subsequent years until further notice, the charges becoming due on December 1 of each year.

In accordance with order issued December 10, 1907, payment of the portion of the installment for operation and maintenance due December 1 of each year must be made on or before April 1 of the following year, and no water will be furnished to any lands until payment of said portion of the installment is made.

PUBLIC NOTICE DATED MARCH 30, 1909

By the public notice issued March 9, 1907, certain lands under the Minidoka project, Idaho, were opened to irrigation, the charges being fixed at \$22 per acre of irrigable land for building the works and 40 cents per acre for operation and maintenance. By public notice, approved February 11, 1909, the annual charge for operation and main-

tenance was increased to 60 cents per acre of irrigable land, beginning with the installment due December 1, 1909, for the season of 1909.

Notice is hereby given that for all irrigable lands affected by the public notices and orders heretofore issued, for which entries are hereafter made, the charge for building the irrigation system shall be \$30 per acre of irrigable land, payable in not more than ten annual installments, each payment of the charge for building, operation, and maintenance being not less than \$3.60 per acre, or some multiple thereof; provided, however, that full payment may be made at any time of any balance of the building charge remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements as to payment, residence, cultivation, and reclamation.

All entries made hereafter for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form and by the first installment of the charges for building, operation, and maintenance, \$3.60 per acre of irrigable land, and all applications for water rights made hereafter for lands in private ownership within the area described shall likewise be subject to a building charge of \$30 per acre, and must be accompanied by the first installment of the charges for building, operation, and maintenance, \$3.60 per acre of irrigable land; provided, that where a prior entryman or water-right applicant has paid at least one full installment of the building, operation, and maintenance charges at the former rate, a water-right application made by his successor in interest shall be subject to the same building charge of \$22 per acre and to the charges for operation and maintenance in force from year to year, in pursuance of the public notices and orders issued, or to be issued, by the Secretary of the Interior.

The second installment shall, in all cases, be due on December 1 of the year following that in which entry or water-right application is made. Subsequent installments shall be due on December 1 of each year until fully paid.

All such entries and applications for water rights hereafter filed shall be subject to all other provisions of the public notices, orders, and rules and regulations heretofore or hereafter issued affecting the said project.

#### OPERATION AND MAINTENANCE

The lining of canal banks with sagebrush to prevent wave action, begun early in 1908, has been continued, and at the end of the present irrigation season a large portion of the canals in sandy ground will have been lined in this manner.

The operating force on the north side in 1909 has consisted of a water master, eight ditch riders, a gate tender, and a telephone clerk. The south side gravity canal is operated in connection with the pumping unit by a water master, six ditch riders, and a telephone clerk.

Many of the laterals on the pumping unit are newly constructed of very dry, loose material through which there has been great loss of water. Probably 3,000 acres will be irrigated by pumping during 1909, water being delivered to each farm unit on a rental basis of \$1 per acre-foot.

#### AGRICULTURAL DEVELOPMENT

The grain crop of 1908 was a disappointment. Dry, windy weather in the spring made much reseeding necessary. Rains in May caused a very rank growth of straw, but thrashing disclosed much shriveled grain and a light yield. These conditions were prevalent in the whole Snake River valley except on meadow land, where good returns were secured. The conditions in 1909 have been worse than those of 1908, as there was practically no rainfall from March 1 to July 1 this year. Severe winds caused a great deal of damage by blowing out crops, and drifting sand cut down much young grain.

For the purpose of illustrating desirable methods of farming for the benefit of settlers who had found difficulty in growing crops on sandy, drifting soils, an 80-acre tract was selected within the unsold portion of the town site of Heyburn, and farming operations were begun thereon in the spring of 1909 by an experienced farmer employed by the service, an effort being made to grow common crops in a manner best adapted to meet the exceptional conditions on the project. In addition, an experienced agriculturist was engaged to give lectures and to visit the farms of the settlers and suggest improved methods. Before the planting of crops this experiment farm was fenced, cleared, and leveled and a concrete block cottage and necessary out-buildings were built.

In some portions of the project a very loose sandy soil is underlaid at 10 to 70 feet in depth by an impervious stratum of clay, generally resting on lava rock. In these areas seepage is excessive and the first irrigation requires the use of very large quantities of water.

The second payment of construction charges, amounting to \$133,920.74, was due December 1, 1908. On June 30, 1909, payments had been made to the amount of \$126,212.07, or 94.2 per cent of the whole. Crop failures would have made it difficult for the settlers to make these payments had not over \$250,000 been expended by the service during 1908 for canal excavation, let in small contracts to the landholders.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Minidoka project*

ASSETS			
Accounts receivable:			
Uncollected water-right building charges.....		\$137,216.07	
Uncollected water-right operation and maintenance charges.....		19,154.45	
			\$156,370.52
Inventories:			
Equipment in use.....	\$45,456.23		
Less depreciation.....	6,890.20		
		38,576.03	
Storehouse.....		33,364.84	
Cement.....		3,853.47	
Iron and steel.....		4,339.80	
Lumber.....		2,953.38	
Explosives.....		6,437.84	
Fuel.....		313.97	
Local products.....		1,872.51	
Unadjusted transfers.....		a 1,936.21	
			89,775.63
Cost of work:			
Building cost.....		2,575,580.72	
Less adjustments.....	342.85		
Less accrued revenues.....	273.81		
		616.66	
			2,574,964.06
Operation and maintenance cost.....			84,306.26
Total assets.....			2,905,416.47

a This is a credit amount.



## LIABILITIES

<b>Investment of the United States:</b>		
Disbursement vouchers.....	\$2,348,230.94	
Transfer vouchers received.....	89,625.15	
	<hr/>	\$2,437,856.09
Collection vouchers.....	13,569.01	
Transfer vouchers issued.....	59,492.03	
	<hr/>	73,061.04
		<hr/>
<b>Accounts payable:</b>		\$2,364,795.05
Unpaid labor.....	16,761.09	
Unpaid purchases.....	89,300.84	
Unpaid contract estimates.....	60,903.47	
Unpaid freight and express.....	54,686.84	
Unpaid passenger fares.....	47.59	
Unredeemed meal tickets.....	651.16	
Unpaid miscellaneous.....	1,342.17	
	<hr/>	223,693.16
<b>Repayments accrued:</b>		
Building.....	268,061.48	
Operation and maintenance.....	48,846.78	
	<hr/>	316,928.26
		<hr/>
<b>Total liabilities.....</b>		<b>2,905,416.47</b>

*Feature costs to June 30, 1909, Minidoka project*

<b>Gravity system:</b>		
Diversion dam and spillway.....	\$504,729.61	
<b>Main canals, north and south side—</b>		
Earthwork.....	\$403,455.74	
Canal structures.....	81,614.43	
	<hr/>	485,060.17
<b>Distributing system:</b>		
Earthwork.....	400,144.24	
Structures and bridges.....	175,283.01	
	<hr/>	575,427.25
<b>Pumping system:</b>		
<b>Power plant at dam—</b>		
Buildings.....	71,107.71	
Installation of machinery.....	85,928.44	
Enlargement of diversion channel.....	28,128.31	
Operation and maintenance of plant when not charged to operation and maintenance of project.....	1,830.97	
	<hr/>	186,995.43
<b>Pumping stations—</b>		
Temporary plant, south side.....	17,226.68	
Station No. 1 and machinery and pressure pipe and camp No. 1.....	72,867.66	
Station No. 2 and machinery and pressure pipe and camp No. 2.....	64,468.09	
Station No. 3 and machinery and pressure pipe and camp No. 3.....	49,223.21	
Station No. 4 and machinery and pressure pipe and camp No. 4.....	101.08	
Station No. 2, south side pumping; operation and maintenance of, when not charged to operation and maintenance of project.....	1,164.78	
	<hr/>	205,051.50
<b>Wasteways and feeders—</b>		
Earthwork.....	289,815.50	
Structures.....	59,061.50	
Operation of canal system when not charged to operation and maintenance of project.....	2,415.28	
	<hr/>	351,292.28
<b>Transmission system: Construction.....</b>		19,509.31
<b>Telephone system:</b>		
Construction.....	24,932.96	
Maintenance.....	14.13	
	<hr/>	24,947.09
<b>Real estate (rights and property): Lands purchased.....</b>		31,479.92
<b>Buildings: Construction.....</b>		20,959.29

Irrigable lands: Farm-unit subdivision and soil examination.....		\$3, 834. 29
Roads and highways:		
Construction.....	\$3, 718. 85	
Maintenance.....	1, 214. 84	
		4, 933. 69
Wells: Drilling.....		3, 127. 06
Examination of project as a whole: Survey and design.....		77, 288. 10
Administration of project as a whole:		
General expense.....	77, 863. 43	
Engineering.....	3, 082. 30	
		80, 945. 73
Total building cost.....		2, 575, 580. 72
Operation and maintenance:		
Telephone system.....	872. 80	
Experimental farm.....	5, 923. 56	
Dam and headworks.....	1, 352. 82	
Canal, sublateral and weather bureau.....	45, 941. 30	
Jackson Lake dam.....	7. 50	
Administration charges.....	30, 208. 28	
		84, 306. 26
Total building and operation and maintenance cost as per debit in cost of work in statement of assets and liabilities.....		2, 659, 886. 98

## PAYETTE-BOISE PROJECT

## LOCATION AND CLIMATIC CONDITIONS

State: Idaho.

Counties: Ada and Canyon.

Townships: 1 to 10 N., Rs. 1 to 5 W. and 1 to 2 E., Boise meridian.

Railroads: Oregon Short Line; Boise, Nampa and Owyhee; Idaho Northern.

Railroad stations: Boise, Nampa, Caldwell, and Payette, Idaho.

Average elevation of irrigable area: 2,500 feet above sea level.

Average annual rainfall on irrigable area: 12.7 inches.

Range of temperature on irrigable area: -28° F. to 107° F.

## WATER SUPPLY

Source of water supply: Boise and Payette rivers.

Area of drainage basin: 6,000 square miles.

Average elevation of drainage basin: 5,000 feet above sea level.

Average annual rainfall on drainage basin: 25 inches.

Average annual run-off of drainage basin: 3,600,000 acre-feet.

ENGINEERING DATA FOR SOUTH SIDE BOISE UNIT <sup>a</sup>

Reservoirs: Deer Flat—area, 9,250 acres; capacity, 186,000 acre-feet; no spillway. Rossi—area, 491 acres; capacity, 34,000 acre-feet. Alexander—area, 425 acres; capacity, 25,000 acre-feet. Bascom—area, 801 acres; capacity, 37,000 acre-feet. Others not located.

Storage dams: Upper Deer Flat—type, earthfill; maximum height, 70 feet; length of crest, 4,000 feet; contents, 932,200 cubic yards. Lower Deer Flat—type, earthfill; maximum height, 40 feet; length of crest, 7,200 feet; contents, 936,600 cubic yards. Others not designed.

Diversion dam: Boise River—type, cyclopean masonry weir; maximum height, 45 feet; length of crest, including logway, 246 feet.

Length of canals: 83 miles with capacities greater than 300 second-feet; 100 miles with capacities less than 300 and greater than 50 second-feet; 360 miles with capacities less than 50 second-feet.

<sup>a</sup> Engineering data for the remainder of the project has not been determined further than as set forth in previous reports.

Water power: Estimated total, 4,000 horsepower.

Construction of project authorized: March 27, 1905.

Per cent completed: Entire project, <sup>a</sup>14; south side Boise unit, <sup>a</sup>20; south side Boise unit, exclusive of storage works on the headwaters of Boise River, 67.

#### AGRICULTURAL CONDITIONS

Irrigable area: South side Boise unit, 243,000 acres. (Sucker Creek tract not included.)

Ownership of irrigable lands (south side Boise unit): Public, 67,711 acres; State, 23,039 acres; private, 152,250 acres.

Lands irrigated, season of 1909 (Boise division): 22,000 acres from Reclamation Service canals; 88,000 acres from private canals.

Character of soil of irrigable area: Light sandy loam.

Principal products: Alfalfa, sugar beets, apples, prunes, and small fruits.

Principal markets: Payette, Nampa, Boise, Meridian, and Caldwell, Idaho; Portland, Oreg.; eastern cities.

#### GENERAL STATEMENT

A detailed description of the Payette-Boise project is given in the fifth annual report, and general descriptions of the project and of the progress of work thereon may be found in other annual reports.

No work, other than preliminary investigations, has been done on the Payette division of the project and on the north side Boise unit of the Boise division. The plan of the south side Boise unit provides for storage reservoirs on the headwaters of Boise River, a storage reservoir in Deer Flat near Caldwell and Nampa, Idaho, a diversion dam on Boise River about 8 miles above Boise, diverting water on the south side of the river into an inlet and distributing canal supplying Deer Flat reservoir and covering lands on the south side of Boise River in the Boise and Snake River valleys. This dam also diverts water into a small canal at its right extremity, supplying a small area of land lying north of Boise River above Boise. Of the irrigable lands in the south side Boise unit about 90,000 acres can be served from Deer Flat reservoir, and the excess stored water in this reservoir can be returned to Boise River to satisfy prior rights along the lower river, and thus release from these rights water which can be diverted to lands taking water from the inlet canal. The other lands of the south side Boise unit will be served with flood water until storage reservoirs are constructed on the headwaters of Boise River.

#### BOISE RIVER DAM

At the close of the fiscal year of 1908, 91 per cent of the work on the Boise River dam had been done, and the structure was brought to completion on October 10, 1908. The dam has been in use throughout the season of 1909. The timber crib apron below the spillway was damaged by logs passing over the spillway instead of through the logway, and preparations are being made for beginning repairs thereto.

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<sup>a</sup>Uncertain, owing to unknown storage possibilities.

## MAIN SOUTH SIDE CANAL

Excavation work in the construction of the main south side canal for a bottom width of 40 feet was completed for the opening of the irrigation season of 1909, the structures on this canal having been completed during the preceding season. The ultimate bottom width of the main south side canal in earth sections will be 70 feet. It is probable that portions of the canal in the first few miles of its length will be left with a 40-foot bottom width and will be lined. It is also planned to install a complete system of checks in the canal prior to the coming irrigation season. This widening, lining, and checking of the canal remain to be done.

## DEER FLAT RESERVOIR

In the seventh annual report the lower Deer Flat embankment was reported as completed and the upper Deer Flat embankment was reported as 98 per cent completed on June 30, 1908. The upper embankment was completed on September 1, 1908, and water was run into the reservoir between the middle of February and the close of the fiscal year. The appearance of seepage water below the upper embankment has made it necessary to make some improvements at this structure. These improvements were begun on June 24, 1909, and will consist of blanketing with gravel a strip about 200 feet wide and 1,000 feet long immediately below the embankment, driving a line of sheet piling at the lower edge of this blanket and placing a closed drain beneath the blanket above the line of piling to carry off the seepage water to an open drain. Additional protection from wave action on both of the embankments remains to be provided, and a study is at present being made to determine the kind of protection that will be most economical and efficient.

The condemnation proceedings for acquiring the rights of way for submerged lands in the reservoir have been brought to a conclusion and all necessary rights of way have been obtained.

## DISTRIBUTION SYSTEM OF SOUTH SIDE BOISE UNIT

The construction of structures—such as bridges, small drops, checks, turn-outs, and weirs—during the past fiscal year has been done mainly by force account. Work on the excavation of the distribution system has been in progress throughout the entire year, and has been carried on mainly through small cash and cooperative contracts. There were 185 cooperative contracts let during the fiscal year, involving the excavation of about 1,567,900 cubic yards of material. Of this amount 1,262,894 cubic yards had been excavated on June 30, 1909, for which cooperative certificates amounting to \$213,309.41 have been issued. There have been let 145 contracts on a cash basis, involving the excavation of about 621,900 cubic yards of material. Of this amount 610,859 cubic yards were excavated prior to June 30, 1909. In addition to this work, 106,611 cubic yards have been removed by force account. At the close of the fiscal year 69 per cent of the excavation work in connection with the distribution system had been completed.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal current contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Payette-Boise project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
89	Feb. 21, 1906	Page & Brinton.....	Main canal, structures.	\$48,855.00	\$31,640.74	June 30, 1908
101	May 4, 1906	Illinois Steel Co.....	Cement.....	17,422.50	\$ 17,712.00	
103	May 19, 1906	Page & Brinton.....	Main canal, excavation.	135,900.00	244,111.13	Oct. 28, 1908
104	Feb. 21, 1906	Utah Fireproofing Co.	Boise River dam and headworks.	158,950.00	133,534.33	Jan. 1, 1908
212	Nov. 19, 1907	Kansas Portland Cement Co.	Cement.....	5,000.00	5,460.70	Apr. 1, 1908
231	Apr. 2, 1908	Western Building Material Co.	.....do.....	4,250.00	3,179.70	Oct. 1, 1908
282	Mar. 2, 1909	Colorado Portland Cement Co.	.....do.....	749.58	749.58	Dec. 1, 1909

<sup>a</sup> Completed.

## SETTLEMENT

Practically all of the public land on the project has been entered. Some of this land, however, has been entered in tracts exceeding 80 acres and relinquishments are being made of excess holdings, thus giving some opportunity for new settlers to secure land.

## OPERATION AND MAINTENANCE

Water has been delivered to owners of stock in the New York Canal Company in accordance with the provisions of the contract between the United States and that company. Water has been delivered on a rental basis to settlers throughout various portions of the project at the rate of 75 cents per acre-foot, and 6,172 acre-feet of water had been applied for on this basis on June 30.

Comparatively little difficulty has been experienced in maintaining the canal system of the project during the present irrigation season with the exception of a stretch about 2 miles in length at the upper end of the main south side canal. On this portion of the canal it has been necessary to maintain a very careful day and night watch to prevent breaks, but in spite of this care a disastrous break occurred May 23, 1909.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Payette-Boise project*

## ASSETS.

<b>Inventories.</b>		
Mercantile store.....	\$42.93	
Equipment in use.....	60,723.37	
Storehouse.....	17,503.96	
Cement.....	4,598.87	
Iron and steel.....	1,900.87	
Lumber.....	4,480.15	
Forage.....	2,357.18	
Cash in office safe.....	80.50	
Local products.....	1,067.13	
Unadjusted transfers.....	7,482.01	
		<b>\$100,216.97</b>

Cost of work:		
Building cost.....	\$2,684,594.88	
Less adjustments.....	\$771.61	
Less accrued revenues.....	77,419.44	
	<u>78,191.05</u>	
		\$2,606,403.83
Total assets.....		2,706,620.80

## LIABILITIES.

Investment of the United States:		
Disbursement vouchers.....	\$2,344,633.98	
Transfer vouchers received.....	63,856.98	
	<u>\$2,408,490.96</u>	
Collection vouchers.....	14,818.16	
Transfer vouchers issued.....	19,019.53	
	<u>33,837.69</u>	
		\$2,374,653.27
Accounts payable:		
Unpaid labor.....	14,436.79	
Unpaid purchases.....	43,267.61	
Unpaid contract estimates.....	255,413.13	
Unpaid contract holdbacks.....	4,619.67	
Unpaid freight and express.....	14,063.55	
Unpaid passenger fares.....	166.78	
	<u>331,967.53</u>	
Total liabilities.....		2,706,620.80

*Feature costs to June 30, 1909, Payette-Boise project*

Diversion dam in Boise River.....		\$266,818.51
Main south side canal:		
Earthwork.....	\$743,056.70	
Structures.....	109,520.37	
	<u>852,577.07</u>	
Distributing system from main canal:		
Earthwork.....	31,083.94	
Structures.....	43,590.99	
	<u>74,674.93</u>	
Storage Deer Flat reservoir:		
Upper embankment.....	290,370.91	
Lower embankment.....	288,434.47	
First equalizing trench.....	5,075.81	
Second equalizing trench.....	2,198.89	
Small Deer Flat embankment.....	67.87	
Right of way (real estate).....	215,375.77	
	<u>801,523.72</u>	
Distributing system from reservoir:		
Earthwork.....	352,274.30	
Structures.....	85,537.54	
	<u>437,811.84</u>	
Irrigable lands: Farm-unit subdivision and soil examination.....		7,172.73
Storage, Payette division: Right of way for Payette Lake reservoir.....		1,678.54
Administration of project as a whole:		
Project office.....	110,158.66	
Supervising office.....	4,981.22	
Warehouse at Nampa.....	378.20	
Office and warehouse at Caldwell.....	393.57	
	<u>115,911.65</u>	
Examination of project as a whole:		
Topographic surveys.....	13,943.47	
Preliminary location and final surveys.....	67,837.20	
	<u>81,780.67</u>	
Main north side canal: Flume on penitentiary lateral.....		611.70
Operation and maintenance during construction:		
Old section of New York canal above dam.....	14,429.58	
Operation of main south side canal.....	9,045.96	
Maintenance of main south side canal system.....	18,129.42	
Operation of canals from storage system.....	957.00	

## Operation and maintenance during construction—Continued.

Maintenance of canals from storage system.....	\$724. 93	
Maintenance of penitentiary canal.....	90. 50	
Repairing upper Deer Flat embankment.....	656. 13	
		<hr/> \$44, 033. 52

Total building and operation and maintenance cost during construction, as per debit in cost of work in statement of assets and liabilities ..... 2, 684, 594. 88

**PORT NEUF PROJECT**

During the fiscal year a preliminary investigation of the Port Neuf project was made, and a report and estimate of irrigation possibilities in the valley of Port Neuf River have been prepared and submitted to the director. The proposed irrigation plan of the project consists in the storage of the flood waters of Blackfoot River in a reservoir to be constructed at Blackfoot Marsh; the delivery of stored water to the channel of Blackfoot River, and its diversion, 15 miles below the reservoir, into a canal discharging into Port Neuf River; and two diversions from Port Neuf River, supplying water, respectively, to about 25,000 acres of land between Chesterfield and Bancroft, in Bannock County, and to about 40,000 acres between Pocatello and American Falls, in Bannock and Oneida counties. The total expenditures to June 30, 1909, amount to \$2,165.77.

**SNAKE RIVER STORAGE****GENERAL STATEMENT**

The plans for Snake River storage comprise the various feasible plans for the storage of water on Snake River and its tributaries, in order to provide a flow in the lower Snake River, regulated to conform so far as possible to the needs of irrigation. Detailed and general descriptions of storage facilities in the Snake River basin may be found in previous annual reports in connection with plans for the Minidoka project.

**JACKSON LAKE RESERVOIR**

A map of Jackson Lake and a description of storage possibilities of the surrounding region may be found in the second annual report, and further discussion appears in the fourth annual report. In June of the present year a drilling party began investigations of the foundation at the site of the proposed permanent dam. More extensive surveys of the lake shore have been undertaken and a reconnaissance is under way to determine the advisability of constructing a road to the dam site that will be shorter than the existing one, the distance by road from the nearest railroad station, Yellowstone, on the Oregon Short Line, being now about 102 miles.

The area of the drainage basin above the site of the proposed storage dam is 980 square miles, and the annual run-off at the site of the dam for the five years past has been approximately as follows:

	Acre-feet.
1904.....	1,520,000
1905.....	920,000
1906.....	1,100,000
1907.....	1,640,000
1908.....	1,350,000
Average.....	1,306,000

The approximate areas and capacities of the proposed reservoir for different elevations of water surface are shown in the following table:

*Elevations, areas, and capacities, Jackson Lake reservoir.*

Rise.	Elevation of water surface.	Area.	Capacity between elevations.	Total capacity.
<i>Feet.</i>	<i>Feet.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
0	6,733	19,224	210,940	210,940
10	6,743	22,964	246,160	457,100
20	6,753	26,268	270,440	727,540
30	6,763	27,820	289,100	1,016,640
40	6,773	30,000	151,250	1,167,890
45	6,778	30,500	153,750	1,321,640
50	6,783	31,000	156,250	1,477,890
55	6,788	31,500		

#### SWAN VALLEY RESERVOIR

The proposed Swan Valley reservoir site is located on the South Fork of Snake River about 120 miles below the outlet of Jackson Lake, and lies in the extreme eastern part of Idaho, Tps. 1 and 2 N., Rs. 43 and 44 E., Boise meridian. A survey of the site of the proposed dam was made in 1906, and surveys of flow line and profiles of dam sites for several locations were made in June, 1908. The sides of the canyon are of solid rock and the river bed is of coarse gravel. An economical spillway can be cut in rock on the north side of the canyon. No tests of the foundation have been made nor has any further engineering work been done in connection with the dam.

The run-off at the site of the dam for five years past has been estimated as follows:

	Acre-feet.
1904.....	6,420,000
1905.....	3,030,000
1906.....	4,070,000
1907.....	6,360,000
1908.....	5,000,000
Average.....	4,976,000



The approximate areas and capacities of the proposed reservoir for different elevations of water surface are shown in the following table:

*Elevations, areas, and capacities, Swan Valley reservoir*

Rise.	Elevation of water surface.	Area.	Capacity between elevations.	Total capacity.
<i>Feet.</i>	<i>Feet.</i>	<i>Acres.</i>	<i>Acre-feet.</i>	<i>Acre-feet.</i>
0	5,300	7	20	20
5	5,305		180	200
10	5,310	65	440	640
15	5,315	110	720	1,360
20	5,320	179	1,130	2,490
25	5,325	274	2,040	4,530
30	5,330	540	3,730	8,260
35	5,335	952	6,250	14,510
40	5,340	1,547	9,060	23,570
45	5,345	2,078	11,900	35,470
50	5,350	2,682	14,430	49,900
55	5,355	3,091	16,640	66,540
60	5,360	3,567	19,100	85,640
65	5,365	4,072	22,010	107,650
70	5,370	4,734	24,780	132,430
75	5,375	5,177	27,530	159,960
80	5,380	5,834	30,570	190,430
85	5,385	6,394	32,930	223,460
90	5,390	6,777	35,130	258,590
95	5,395	7,276	37,260	295,850
100	5,400	7,628	39,550	335,400
105	5,405	8,190	42,150	377,550
110	5,410	8,670	44,420	421,970
115	5,415	9,096	46,590	468,560
120	5,420	9,539	48,860	517,420
125	5,425	10,004		

#### OPERATION AND MAINTENANCE

By controlling the temporary dam at Jackson Lake, stored waters to the amount of approximately 155,000 acre-feet were delivered during August and September, 1908, to the Minidoka project, to the North Side Twin Falls Land and Water Company, and to the American Falls Canal and Power Company. The maximum discharge from the lake above the normal flow of Snake River during this period was 3,200 second-feet.

Observations indicate that it requires between six and seven days for water discharged from Jackson Lake to reach Minidoka dam.

The total expenditures on the project to June 30, 1909, amount to \$36,409.73.

## KANSAS

### GARDEN CITY PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: Kansas.

Counties: Finney and Kearny.

Townships: 23 and 24 S., Rs. 32 to 34 W., sixth principal meridian.

Railroad: Atchison, Topeka and Santa Fe.

Railroad stations: Garden City and Deerfield, Kans.

Average elevation of irrigable area: 2,925 feet above sea level.

Average annual rainfall on irrigable area: 20 inches.

Range of temperature on irrigable area:  $-20^{\circ}$  F. to  $105^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Shallow wells near Arkansas River.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Length of canals: 2.1 miles with capacities less than 300 and greater than 50 second-feet and 1.7 miles with capacities less than 50 second-feet constructed and operated by the Reclamation Service; 20 miles of main canal and 12 miles of laterals constructed and operated by the water users' association.

Steam power: 600 horsepower developed in steam turbine power plant.

Construction of project authorized: October 5, 1905.

Per cent completed: 98.

#### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 10,677 acres.

Ownership of irrigable lands: All private.

Lands irrigated, season of 1909: 4,265 acres, including 3,285 acres that received pumped water.

Character of soil of irrigable area: Fertile black sandy loam.

Duty of water: 2 acre-feet per acre per annum at the farm.

Principal products: Alfalfa, sugar beets, melons, sweet potatoes, small fruits.

Principal markets: Garden City, Kans.; Kansas City, Mo.; Chicago, Ill.

#### LANDS OPENED FOR IRRIGATION

Dates of public notices: March 6, 1908, and November 30, 1908.

Location of lands opened: Tps. 23 and 24 S.; Rs. 32, 33, and 34 W., sixth principal meridian.

Irrigable area opened: Private, 10,677 acres.

Limit of area of farm units: 160 acres.

Building charge per acre of irrigable land: \$37.50.

Annual operation and maintenance charge: \$2.75 per acre of irrigable land.

#### GENERAL STATEMENT

The Garden City project was constructed to utilize by pumping the underground flow of the Arkansas River valley.

The power house is located on the main line of the Atchison, Topeka and Santa Fe Railroad at Deerfield, Kans. The building is constructed of pressed brick and concrete and contains two 300-horsepower steam turbines direct connected to 6,600-volt generators. The

electrical energy is transmitted to 23 pumping stations, which are located along a concrete-lined canal 20,000 feet in length. At each of three of these stations the pumps are connected to twelve 15-inch wells, from 30 to 50 feet in depth. At the other twenty stations the pumps are connected to nine wells each. The pumps are 9 and 10-inch vertical centrifugal pumps, each direct connected to a 25-horsepower 3-phase induction motor. All of the pumping units are installed and are now in operation.

The pumped water is discharged from the concrete-lined canal into the Farmers' ditch through which it is distributed to the lands to be irrigated, which lie northwest of Garden City, Kans.

#### PUMPS

During the fiscal year 13 pumping units, consisting of 10-inch centrifugal pumps, each direct connected to a 25-horsepower 3-phase induction motor, were installed south of the river and placed in operation.

#### WELLS

A soft-water well 247 feet deep was drilled at the power plant for boiler feed purposes. The yield was not very great, but was ample for the requirements of the power plant. The water is of excellent quality. In order to determine the possibilities of deep wells for irrigation purposes the drilling of a deep test well at station No. 2, north of the river, was undertaken. The well is now 286 feet deep.

The 12-foot well for water for condensers was completed, and as the yield was not sufficient for the purposes of the plant, a cooling tower was installed.

#### FUEL CHANGE

The fuel for the plant was changed from coal to oil and a 55,000-gallon concrete oil storage tank was constructed. Patent furnaces and burners were installed under the boilers and a very marked saving in cost of fuel has resulted.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Garden City project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
124	Sept. 11, 1906	Camden Iron Works...	Pumping apparatus.	\$15,070.00	\$9,510.00	May 3, 1907
215	Jan. 27, 1908	Buffalo Steam Pump Co.	Pumps.....	20,230.00	19,595.60	May 31, 1908
223	Mar. 16, 1908	United Kansas Portland Cement Co.	Cement.....	.....	53.46	Oct. 1, 1908
258	Oct. 1, 1908	Iola Portland Cement Co.	.....do.....	.....	38.40	June 1, 1909
273	Feb. 25, 1909	.....do.....	.....do.....	.....	128.00	Dec. 1, 1909

• Completed.

## PUBLIC NOTICE DATED NOVEMBER 30, 1908

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

The Garden City project in Kansas has been constructed and was placed in operation under the provisions of the reclamation act in the irrigation season of 1908, water being furnished for the irrigable land shown upon plats of townships 23 and 24 south, ranges 32, 33, and 34 west, sixth principal meridian, approved March 2, 1908, by the Secretary of the Interior, and on file in the local land office at Dodge City, Kans.

The limit of area for which water-right applications may be made for lands in private ownership is 160 acres of irrigable land for each landowner.

The charges per acre of irrigable land which can be irrigated by the waters from the said irrigation project are in two parts, as follows:

1. The building of the irrigation system, \$37.50 per acre of irrigable land, payable in not more than ten annual installments, each not less than \$3.75 per acre or some multiple thereof; provided, however, that full payment may be made at any time of any balance remaining due.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not. The operation and maintenance charges for the irrigation season of 1909 and until further notice will be \$2.75 per acre of irrigable land whether water is used thereon or not.

The first installment on account of said charges for all irrigable areas shown on these plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable at the local land office at Dodge City, Kans., on December 1, 1909, and the installments for the year 1910 and subsequent years shall be due and payable on the same date and at the same place.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1910 unless the portion of the installment for operation and maintenance due and payable on or before December 1, 1909, has been paid on or before April 1, 1910, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before April 1 of that year of the portion of the installment for operation and maintenance which was due and payable on December 1 of the preceding year.

No water will be furnished for any lands unless water-right application has been filed therefor.

The charges herein provided for may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the Garden City project for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office, but in case this privilege is availed of, the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

The public notice issued March 6, 1908, is hereby revoked, but applications made thereunder may be amended to conform to the provisions of this public notice, and shall thereupon become subject thereto, and any moneys heretofore paid will be applied upon the charges herein announced. Water-right applications heretofore made which are not so amended within thirty days after notice shall remain in force and be subject to the provisions of the public notice of March 6, 1908.

The instructions accompanying the public notice of March 6, 1908, were repeated, with appropriate changes of dates and amounts, in a letter transmitting the notice to the Commissioner of the General Land Office.

## SETTLEMENT

All of the land under the project is in private ownership and the greater part of it is under cultivation. The expense connected with pumping water for irrigation and the restrictions of the public notice in regard to residence is tending to force the lands into smaller holdings.

## OPERATION AND MAINTENANCE

All of the pumps were installed by July, 1908, and were placed in operation. As there was little rainfall and practically no water in the river during the irrigation season of 1908, the plant had to be operated almost continually, and the draw on the underground flow was long and heavy. The water plane was drawn down very low and the discharge from the pumps materially decreased. The plant was placed in operation for the season of 1909 on April 5, and has been furnishing water except when there was considerable rainfall or water was available in the river.

## AGRICULTURAL DEVELOPMENT

There are in the project 11,767 acres of land, of which 10,677 acres are irrigable, divided into 121 holdings. From July 1 to October 10, 1908, 4,885 acres of irrigated land received pumped water and from April 5 to June 30, 1909, 4,265 acres of land were irrigated of which 3,285 acres received pumped water. Seventy-five certificates have been issued providing water rights for 6,975.97 acres of irrigable land.

The principal crops are alfalfa, sugar beets, melons, sweet potatoes, and small fruits. The soil is very fertile, and produces abundantly with ample irrigation. Alfalfa can be depended on for two to four cuttings a year, each cutting averaging about a ton to the acre, and usually sells for \$6 to \$11 per ton in the stack. Of sugar beets about 9 tons can be produced to the acre, and the selling price is about \$5 per ton. Melons and sweet potatoes yield well and are profitable crops.

The areas planted to various crops for the season of 1909 are as follows:

	Acres.		Acres.
Alfalfa .....	2,764	Barley .....	203
Sugar beets .....	1,461	Oats .....	155
Cane .....	442	Wheat .....	154
Cane and alfalfa .....	413	Corn .....	113
Barley and alfalfa .....	355	Other crops .....	258
Oats and alfalfa .....	336		
Kaffir corn .....	299	Total .....	6,953

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Garden City project*

ASSETS			
Accounts receivable:			
Uncollected freight refunds .....			\$901.64
Inventories:			
Government animals .....		\$380.00	
Equipment in use .....		5,938.38	
Storehouse .....		1,900.01	
Cement .....		107.73	
Fuel .....		769.39	
Unadjusted transfers .....		101.56	
			9,197.07
Cost of work:			
Building cost .....		336,760.34	
Less adjustments .....	\$1,446.40		
Less accrued revenues .....	7,494.43		
		8,940.83	
Operation and maintenance cost .....			327,819.51
			34,701.60
Total assets .....			372,619.82

## LIABILITIES

Investment of the United States:		
Disbursement vouchers.....	\$353, 436. 23	
Transfer vouchers received.....	9, 859. 32	
		\$363, 295. 55
Collection vouchers.....	1, 686. 05	
Transfer vouchers issued.....	3, 900. 58	
		5, 586. 63
		\$357, 708. 92
Accounts payable:		
Unpaid labor.....		459. 99
Unpaid purchases.....		2, 318. 73
Unpaid contract holdbacks.....		8, 825. 00
Unpaid freight and express.....		3, 103. 91
Unpaid passenger fares.....		203. 27
		14, 910. 90
Total liabilities.....		372, 619. 82

*Feature costs to June 30, 1909, Garden City project*

Power station:		
Power house and generating machinery.....	\$82, 344. 13	
Power-house accessories.....	26, 555. 25	
		\$108, 899. 38
Transmission line and electrical installation (transmission line, pump houses, electric lighting, etc.).....		15, 467. 40
Pumping stations:		
Pumping houses and pumping units.....	\$55, 578. 10	
Supply wells.....	53, 160. 33	
		108, 736. 43
Canal system:		
Earthwork.....	58, 925. 97	
Structures.....	29, 523. 31	
		88, 449. 28
Real estate (rights and property): Lands purchased.....		1, 349. 23
Buildings:		
Oil house.....	374. 85	
Workshop.....	730. 94	
Buildings at headquarters.....	4, 880. 45	
		5, 986. 24
Irrigable lands: Farm-unit subdivision.....		253. 66
Preliminary examination: Proposed extension of project.....		7. 89
Administration of project as a whole:		
General expense.....	7, 343. 60	
United States sugar land litigation.....	267. 23	
		7, 610. 83
Total building cost.....		336, 760. 34
Operation and maintenance:		
Telephone line.....	4. 03	
Transmission line.....	10. 91	
Power plant.....	23, 668. 21	
Power-plant accessories.....	364. 06	
Miscellaneous operating charges.....	9, 412. 70	
Canal system.....	1, 147. 45	
Inventory of unused supplies.....	94. 24	
		34, 701. 60
Total building and operation and maintenance cost, as per debit in cost of work in statement of assets and liabilities.....		371, 461. 94

## **MONTANA**

### **BLACKFEET (INDIAN) PROJECT**

#### **LOCATION AND CLIMATIC CONDITIONS**

State: Montana.  
County: Teton.  
Townships: 31 to 34 N., Rs. 5 to 10 W.; 29 N., R. 8 W.; 30 N., Rs. 6 to 9 W.; and 35 N., R. 7 W., Montana meridian.  
Railroad: Great Northern.  
Railroad stations: Browning, Bombay, Seville, Opal, and Cut Bank, Mont.  
Average elevation of irrigable area: 3,850 feet above sea level.  
Average annual rainfall on irrigable area: 16 inches.  
Range of temperature on irrigable area:  $-50^{\circ}$  F. to  $100^{\circ}$  F.

#### **WATER SUPPLY**

Source of water supply: Cut Bank, Two Medicine, Badger and Birch creeks.  
Area of drainage basin: 1,000 square miles.  
Average elevation of drainage basin: 6,700 feet above sea level.  
Average annual rainfall on drainage basin: 60 inches.

#### **ENGINEERING DATA FOR COMPLETE PROJECT**

Reservoirs: Two Medicine Lake—area, 723 acres; capacity, 9,886 acre-feet; length of spillway, 50 feet; elevation of spillway, 25 feet above stream bed. Spring Lake—area, 1,400 acres; capacity, 29,000 acre-feet; length of spillway, 50 feet; elevation of spillway, 45 feet above stream bed. Four Horns—area, 1,867 acres; capacity, 60,640 acre-feet; length of spillway, 50 feet; elevation of spillway, 57 feet above stream bed.

Storage dams: Two Medicine Lake—type, rockfilled log crib; maximum height, 50 feet; length of crest, 435 feet; contents, not computed. Spring Lake—type, earthfill; maximum height, 50 feet; length of crest, 1,700 feet; contents, 12,500 cubic yards. Four Horns—type, earthfill; maximum height, 62 feet; length of crest, 2,225 feet; contents, 149,000 cubic yards.

Diversion dams: For Badger, Birch and Cut Bank creeks, not designed. Two Medicine—type, brush and rock; maximum height, 4 feet; length of weir, 165 feet; length of earthfill, 1,000 feet.

Length of canals: 40 miles with capacities greater than 300 second-feet; 144 miles with capacities less than 300 and greater than 50 second-feet; 25 miles with capacities less than 50 second-feet.

Aggregate length of dikes: 800 feet.

Per cent completed: Entire project, 3; Two Medicine unit, 12.

#### **AGRICULTURAL CONDITIONS**

Irrigable area: Whole project, 132,000 acres; Two Medicine unit, 45,000 acres.

Ownership of irrigable lands (whole project): Public (Indian), about 121,000 acres; public (not Indian), 10,000 acres; private, about 1,000 acres.

Character of soil of irrigable area: Rich sandy loam.

Principal products: Hay, grain and vegetables.

Principal markets: Local and eastern.

#### **GENERAL STATEMENT**

A detailed description of the Blackfeet project may be found in the seventh annual report. Briefly, the irrigation plan of the Blackfeet project involves the construction of five irrigation systems on the

Blackfeet Indian Reservation, as follows: The Carlow canal system, heading on the right bank of Cut Bank Creek, and supplying water to about 20,000 acres of land near Carlow station on the Great Northern Railway; the Cut Bank canal system, heading on the left bank of Cut Bank Creek, and supplying water to 24,000 acres of land, 11,000 acres of which are outside of the reservation and directly north of the town of Cut Bank; the Two Medicine canal system, diverting from the left bank of Two Medicine Creek, and supplying water to 45,000 acres of land; the Badger-Fisher canal system, diverting from the right bank of Badger Creek, and supplying water to 39,000 acres of land between Birch and Badger creeks; and the Birch Creek canal system, diverting from Birch Creek, and supplying water to about 4,000 acres of land between Birch and Blacktail creeks. The irrigable lands of the project are located in general in the southeastern portion of the Blackfeet Indian Reservation between Cut Bank and Birch creeks. Reconnaissance surveys have been made of all of the above five units, but construction work has been commenced only on the Two Medicine unit.

#### TWO MEDICINE UNIT

Final surveys for the Two Medicine unit were begun in the spring of 1908, continued throughout the field season, and resumed in the spring of 1909. Fifty-six miles of preliminary and final location of main canals have been made and cross-sectioned, about 60 miles of location of lateral canals have been completed, over one-half of which has been cross-sectioned, and topographic surveys and maps covering an area of 140 square miles have been made.

Construction on the main canal was begun in the latter part of July, 1908, and was suspended for the winter early in December. Work was resumed about May 1, 1909. Two miles of main canal have been completed and 3 miles have been about 70 per cent completed. Cross-drainage culverts and flumes have been erected on the first 18 miles of canal. There have been built 32 miles of telephone line, a headquarters camp of 10 temporary buildings, a division camp for engineers of 4 temporary buildings, 2 construction camps, one of 7 and one of 8 temporary buildings, and 5 miscellaneous temporary buildings for use as storehouses, stables, etc. Some work has been done on roads, including the building of several small bridges, in order that hauling might be economically done.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Blackfeet project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
224	Mar. 16, 1908	Universal Portland Cement Co.	Cement.....	\$95.00	\$95.00	Oct. 1, 1908
274	Feb. 27, 1909	do.....	do.....	27.00	27.00	Dec. 1, 1909



## FINANCIAL STATUS

*Feature costs to June 30 1909, Blackfeet project*

<b>Diversion works:</b>		
Dam.....	\$156. 95	
Canal headworks.....	5. 83	
		<b>\$162. 78</b>
<b>Canal system:</b>		
Main canal, division 1.....	54, 184. 99	
Main canal, division 2.....	2, 654. 19	
South canal.....	2, 759. 95	
		<b>59, 599. 13</b>
<b>Lateral system:</b>		
Main canal.....	1, 321. 38	
South canal.....	4, 273. 21	
		<b>5, 594. 59</b>
<b>Spring Lake reservoir:</b>		
Storage dam.....	818. 72	
Outlet works.....	6. 34	
Dike at west end of reservoir.....	46. 10	
		<b>871. 16</b>
Telephone line: Construction.....		<b>2, 397. 57</b>
Roads and bridges: Construction.....		<b>351. 71</b>
<b>Buildings:</b>		
Construction.....	10, 041. 62	
Maintenance.....	1, 252. 90	
		<b>11, 294. 52</b>
<b>Examination of project as a whole:</b>		
Water supply.....	371. 83	
Surveys.....	2, 446. 28	
Hydrography.....	1, 107. 75	
		<b>3, 925. 86</b>
Administration of project as a whole: General expense.....		<b>10, 257. 61</b>
Inventory of unused supplies.....		<b>844. 83</b>
<b>Total building cost as per summary in Table 20, page 32 .....</b>		<b>95, 299. 76</b>

## FLATHEAD (INDIAN) PROJECT

## LOCATION AND CLIMATIC CONDITIONS

State: Montana.

Counties: Flathead, Sanders, and Missoula.

Townships: 15 to 25 N., Rs. 17 to 25 W., Montana meridian.

Railroad: Northern Pacific.

Railroad stations: Evaro, Arlee, Ravalli, Dixon, and Perma, Mont.

Average elevation of irrigible area: 2,800 feet above sea level.

Average annual rainfall on irrigible area: 15 inches.

Range of temperature on irrigible area: -30° F. to 100° F.

## WATER SUPPLY

Source of water supply: Flathead, Jocko, and Little Bitter Root rivers; Mud, Crow, Post, Mission and Dry creeks.

Area of drainage basin: 8,000 square miles.

Average elevation of drainage basin: 6,000 feet above sea level.

Run-off of drainage basin in 1908: 9,000,000 acre-feet.

## ENGINEERING DATA FOR COMPLETE PROJECT

Reservoirs: Twelve; aggregate area, 12,000 acres; aggregate capacity, 140,000 acre-feet.

Storage dams: Twelve, most of which will be of the earth and rock-fill type.

Diversion dams: Rock-filled log crib.

## AGRICULTURAL CONDITIONS

Irrigable area (whole project): 150,000 acres.

Ownership of lands (whole project): Flathead and confederated Indian tribes.

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Principal products: Grain, hay, vegetables, apples, and small fruits.

Principal markets: Local mining and lumber camps.

## GENERAL STATEMENT

A description of the Flathead project may be found in the seventh annual report. Briefly, the irrigation plan of this project provides for the irrigation of about 150,000 acres in various parts of the Flathead Indian Reservation. Water will be taken by simple diversion works from several rivers and creeks rising in the Mission Mountains, the stream flow being conserved by storage in about twelve reservoirs, and supplemented by pumping from Flathead River by water power. Irrigable tracts in Jocko and Mission valleys and near Polson have been selected for first development.

## SURVEYS

Surveys begun in the summer of 1908 have determined feasible storage reservoirs and the location of main canal lines necessary to cover a few of the larger tracts of irrigable lands. Topographic surveys of 132,000 acres of irrigable land and reservoir sites have been made. Stream gagings have been made for two seasons on the principal streams, and a study of proper distribution of the available water is in progress.

## CONSTRUCTION

In Jocko valley a canal diverting water from Jocko River and laterals for the irrigation of 6,000 acres have been located, and construction is well advanced. Water will be available on this tract in the season of 1910.

In Mission Valley a canal heading in Mission Creek has been located and construction is well advanced. Water will be available for the irrigation of 4,500 acres in the season of 1910.

On the tract near Polson, canals are being located for the irrigation of about 3,000 acres. Water power, developed on Flathead River, will be utilized for pumping water for this tract and preliminary work in connection with the construction of the power plant has been commenced. Roads have been built, and a shaft is being sunk from which one of the proposed power tunnels will be driven. Plans are being prepared for a generating station and pumping plant.

Project headquarters buildings at St. Ignatius and construction quarters at Jocko and Polson have been built. The telephone line previously constructed connecting Jocko Agency, Arlee, Ravalli, St. Ignatius, and Ronan has been extended to Polson and Newell dam site, a distance of 21 miles, thus completing connection between all construction camps on the project.

No contracts have been let for construction work, the work being performed by force account, Indian labor and teams being employed so far as available. The Reclamation Service has purchased or transferred to this project about one hundred mules and horses, together with plows, scrapers, and other construction equipment.

## SETTLEMENT

The reservation will be formally opened to settlement in April, 1910, and registration for filing on lands was had from July 15 to August 5, 1909, inclusive.

## FINANCIAL STATUS

*Feature costs to June 30, 1909, Flathead project*

<b>Jocko division: Lateral system—</b>		
Preliminary surveys.....	\$8,341.78	
Engineering and design.....	1,160.56	
Camp construction.....	1,204.63	
Earthwork and structures.....	7,927.11	
		\$18,634.08
<b>Mission division: Lateral system—</b>		
Preliminary surveys.....	29,719.30	
Engineering and design.....	645.66	
Camp construction.....	1,347.49	
Earthwork and structures.....	3,355.99	
		35,068.44
<b>Polson division: Canal and lateral system—</b>		
Preliminary surveys.....	2,402.99	
Camp construction.....	817.08	
Earthwork and structures.....	68.49	
Power-plant construction.....	2,028.47	
		5,317.03
<b>Buildings and grounds: Construction—</b>		
Jocko division.....	2,096.52	
Mission division.....	4,657.52	
		6,754.04
<b>Telephone line:</b>		
Construction.....	1,756.32	
Maintenance.....	109.92	
		1,866.24
<b>Administration of project: General expense, undistributed.....</b>		1,180.10
<b>Inventory of unused supplies.....</b>		1,099.87
<b>Total building cost, as per summary in Table 20, page 32.....</b>		69,919.80

## FORT PECK (INDIAN) PROJECT

## LOCATION AND CLIMATIC CONDITIONS

State: Montana.  
 County: Valley.  
 Townships: 26 to 33 N., Rs. 40 to 55 E., Montana meridian.  
 Railroad: Great Northern.  
 Railroad stations: Milk River, Kintyre, Frazer, Oswego, Wolf Point, Macon, Chel-sea, Poplar, Sprole, Brockton, Calais, and Blair, Mont.  
 Average elevation of irrigable area: 2,000 feet above sea level.  
 Average annual rainfall on irrigable area: 13 inches.  
 Range of temperature on irrigable area: -40° F. to 100° F.

## WATER SUPPLY

Source of water supply: Missouri and Poplar rivers, Big Porcupine, Little Porcu-pine, and Big Muddy creeks.  
 Area of drainage basin: 85,000 square miles.

## ENGINEERING DATA FOR MISSOURI RIVER UNIT

Length of canals: 60 miles with capacities greater than 300 second-feet; number of miles with capacities less than 300 second-feet not determined.  
 Aggregate length of tunnels: 4,300 feet.

## AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 130,000 acres; Missouri River unit, 50,000 acres clear land with possible extensions covering an additional 25,000 acres of brush land.

Character of soil of irrigable area: Heavy clay and loam.

Principal products: Hay, grain, vegetables.

Principal markets: Local.

## SURVEYS

Preliminary surveys were made during the season of 1908, covering irrigable lands as follows: Eight thousand acres in the vicinity of Milk River station, with water supply from Big Porcupine Creek conserved by storage; 2,000 acres in the vicinity of Frazer, with water supply from Little Porcupine Creek conserved by storage; 20,000 acres in the vicinity of Poplar, and extending along Poplar River a distance of about 35 miles, with water supply from Poplar River, conserved by storage at the forks of Poplar River and West Branch; 15,000 acres lying along the west side of Big Muddy Creek with water supply from Big Muddy Creek conserved by storage at the mouth of Wolf Creek; and 50,000 acres of clear bench land and approximately 25,000 acres of brush and timber land extending along Missouri River which may be irrigated with water from Missouri River by a gravity canal heading near the site of old Fort Peck. Surveys have also been made on two additional tracts of land adjacent to and above the gravity canal that can be irrigated by pumping from the main canal with lifts of 12 and 20 feet, respectively. Each of these tracts comprises approximately 6,000 acres, one lying outside of the Fort Peck Reservation and the other wholly within the reservation. Steam power for the pumping can be developed from coal obtainable on the reservation. Large deposits of coal are found near Brockton on the main line of the Great Northern Railway, and deposits are known to exist at a number of points on the south side of Missouri River.

## MISSOURI RIVER UNIT

At present the most feasible plan for the irrigation of an extended area provides for a gravity canal diverting water from Missouri River near the site of old Fort Peck, about 12 miles west of the reservation boundary and following approximately the line of the Great Northern Railway across the reservation. The main canal will have a total length of about 104 miles. The scarcity of cross drainage renders the project an unusually attractive one as regards economical construction and operation. It is proposed to construct at first only such works as are required for the irrigation of the 50,000 acres of clear bench land. This will require the diversion from Missouri River of 625 second-feet of water, and the main canal will have this capacity for a distance of 29 miles below the headworks. In this reach there will be required a concrete headworks structure, two concrete-lined tunnels, each with a net cross-sectional area of about 90 square feet, respectively 1,600 and 2,700 feet long, a double-barrelled 300-foot concrete siphon crossing at Milk River, and a crossing at Little Porcupine Creek. The first lateral turnout will be about 29 miles below the headworks. At Wolf Creek, about 48 miles below the headworks, a crossing will be required, and 2 miles below this crossing a drop is planned. At the site of this drop the main canal will carry

425 second-feet. A comparatively inexpensive structure will be required for crossing Poplar River, at which point the canal will carry 150 second-feet. The other structures required are such as are used chiefly for operation and maintenance and will be comparatively small.

In June, 1909, a board of engineers considered the surveys and plans of construction proposed for the Fort Peck project, investigated on the ground the various features in detail, reported the project feasible, and approved the plan of construction as herein outlined.

During the field season of 1909 topographic surveys of the main canal location and the greater part of the irrigable lands have been made. Final locations are now being made, and it is proposed to begin construction work immediately at a number of points in order to employ Indians in the work as near their homes as is practicable. Temporary headquarters have been established at Oswego.

The soil of the lands to be irrigated from the gravity canal is mostly gumbo with little evidence of alkali. The Missouri River valley is flat, and the land near the river is from 1 foot to 2 feet higher than that at the foothills. The nature of the soil and the character of the topography will render necessary a very complete drainage system.

#### FINANCIAL STATUS

##### *Feature costs to June 30, 1909, Fort Peck project*

Preliminary examination; location surveys:		
Canal system.....	\$8,022. 28	
Storage works.....	3,431. 01	
		\$11,453. 29
Building and grounds:		
Camp maintenance.....	135. 82	
Clearing grounds.....	43. 50	
		179. 32
Administration of project: General expense, undistributed.....		686.75
Inventory of unused supplies.....		229. 01
Total building cost as per summary in Table 20, page 32.....		12,548. 37

#### HUNTLEY PROJECT

##### LOCATION AND CLIMATIC CONDITIONS

State: Montana.  
 County: Yellowstone.  
 Townships: 2 and 3 N., Rs. 27 to 31 E., Montana meridian.  
 Railroads: Northern Pacific; Chicago, Burlington and Quincy.  
 Railroad stations: Huntley, Osborn, Worden, Newton, Pompey's Pillar, Bull Mountain, Ballantine, and Anita, Mont.  
 Average elevation of irrigable area: 3,000 feet above sea level.  
 Average annual rainfall on irrigable area: 12 inches.  
 Range of temperature on irrigable area: -35° F. to 100° F.

##### WATER SUPPLY

Source of water supply: Yellowstone River.  
 Area of drainage basin: 11,800 square miles.  
 Average elevation of drainage basin: 4,000 feet above sea level.  
 Average annual rainfall on drainage basin: 18 inches.  
 Average annual run-off of drainage basin: 5,000,000 acre-feet.

## ENGINEERING DATA FOR MAIN UNIT

Reservoirs, dikes, and dams: None.

Length of canals: 8.5 miles with capacities greater than 300 second-feet; 19 miles with capacities less than 300 and greater than 50 second-feet; 241 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 2,653 feet.

Water power: Total estimated, 600 horsepower; 286 net horsepower developed.

Construction of project authorized: April 18, 1905.

Main unit completed June, 1907.

## AGRICULTURAL CONDITIONS

Irrigable area (main unit): 28,921 acres.

Ownership of irrigable lands (main unit): Public, 25,729 acres; private, 3,192 acres.

Lands irrigated, season of 1909: Public, 8,000 acres.

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Duty of water:  $2\frac{1}{2}$  acre-feet per acre per annum at the farm.

Principal products: Alfalfa, oats, barley, potatoes, sugar beets, apples.

Principal markets: Billings, Mont.; St. Paul and Minneapolis, Minn.; Denver, Colo.; Kansas City, Mo.

## LANDS OPENED FOR IRRIGATION

Dates of public notices: May 21, 1907; March 3, 1909.

Location of lands opened: Tps. 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Irrigable area opened: Public, 25,729; private, 3,192 acres.

Limit of area of farm units: 160 acres.

Building charge per acre of irrigable land: \$30.

Annual operation and maintenance charge: \$0.60 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Huntley project may be found in the sixth annual report, and the general progress of construction is reported in the third, fourth, fifth and seventh annual reports. Briefly, the irrigation plan of the project provides for the diversion of water from the south side of Yellowstone River about 2 miles above Huntley, Mont., into a main canal, a major part of the water being distributed by gravity through a system of laterals and a small portion being pumped into a highline canal and thence distributed through laterals for irrigation. The power for pumping is developed at a 34-foot drop in the main canal 14 miles below the headgates, and 56 second-feet of water are elevated 45 feet by two centrifugal pumps. The main unit of the project, including the gravity and pumping systems, has been completed, but extensions of both the main canal and the highline canal are contemplated. These extensions would add to the project an irrigable area of about 3,000 acres of public land, in 58 farm units, and 900 acres of irrigable land now in private ownership or in Indian allotments.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Huntley project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909	Completion due.
121	Aug. 29, 1906	Camden Ironworks...	Pumping plant.....	\$12,675.00	\$12,675.00	May 2, 1908
274	Feb. 27, 1909	Universal Portland Cement Co.	Cement.....	128.25	128.25	Dec. 1, 1909

## PUBLIC NOTICE DATED MARCH 3, 1909

The public notice issued May 22, 1907, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), for the Huntley project, Montana, provides that the portion of the instalment for operation and maintenance for the irrigation season of 1908, and until further notice, shall be 60 cents per acre of irrigable land, and that such charges shall become due as announced by the Secretary of the Interior each year.

In pursuance of the terms of said notice, and of the said act of Congress, it is hereby announced that the portion of the instalment for operation and maintenance for the irrigation season of 1909 shall become due on December 1, 1909, and for subsequent seasons on December 1 of each year.

The regulation is hereby established that no water will be furnished in any year unless all operation and maintenance charges then due shall have been paid on or before May 1, of that year. Accordingly no water will be furnished for the irrigation season of 1910 for any land unless the portion of the instalment for operation and maintenance due December 1, 1909, has been paid on or before May 1, 1910, and similarly for each subsequent year.

The said notice also provides that the portion of the charges for building the irrigation system shall be payable in not less than five nor more than ten annual instalments. This is hereby modified so that payment of the building charges may be made in any number of instalments not exceeding ten, each being not less than \$3 per acre or some multiple thereof; provided, however, that full payment may be made at any time of any balance remaining due after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

The Commissioner of the General Land Office was instructed to take the necessary action for putting the provisions of this notice into effect and for its publication in newspapers.

## SETTLEMENT

During the fiscal year 73 settlers have taken up lands, making 311 filings to June 30, 1909, covering a total area of 19,082.22 acres, and an irrigable area of 13,915.28 acres. There still remain open to entry 274 farm units with an irrigable area of 11,814.10 acres and a total area of 13,039.51 acres. During the past three months a large number of letters of inquiry have been received from prospective settlers, and it is anticipated that all lands will have been entered by the close of the season of 1910.

## OPERATION AND MAINTENANCE

Considerable betterment work was done on the distributing systems before commencing delivery of water in the season of 1909, and an ample supply of water was delivered to each farm unit. Measuring weirs are being installed in all laterals and at each farm turnout. A record of the amount of water used on each variety of crop is being kept and valuable data as to duty of water will be available at the close of the season.

## AGRICULTURAL DEVELOPMENT

Many of the settlers on the project have come from the middle west and were inexperienced in irrigation methods, but they have quickly adapted themselves to the new methods of farming and are getting satisfactory results.

The farmers have organized a farmers' club with 185 members for mutual improvement and cooperation in the growing and marketing of crops. This organization is to hold its first annual fair at Huntley

on September 2, and exhibits will be sent to the state fair at Helena, and to the dry-farming congress at Billings.

Preliminary crop reports show a great variety of crops being raised and a tendency toward intensive farming. The condition of crops on the project is satisfactory. Over ten thousand fruit trees have been set out, also a large number of small shade trees.

## TOWNSITES

There are seven government townsites on the project. Lots and acre tracts have been appraised and offered for sale in each townsite. Forty-seven lots have been sold in Huntley, two in Ballantine, one in Osborn, and seven in Pompey's Pillar, as well as a number of the acre tracts.

Huntley has become a thriving town with substantially built stone, brick, and frame buildings, and has a general air of prosperity. A commercial club has been organized and active steps are being taken to encourage new industries.

Osborn has one store and a schoolhouse.

Ballantine has three stores, a lumber yard, a schoolhouse, a church, and a new depot recently erected by the Chicago, Burlington & Quincy Railway.

Worden has a lumber yard and a new depot erected by the Northern Pacific Railway, and a store building is soon to be constructed.

Pompey's Pillar has one store, a lumber yard, and a schoolhouse.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Huntley project*

ASSETS		
Inventories:		
Government animals.....	\$2,068.50	
Equipment in use.....	5,206.82	
Storehouse.....	571.45	
Unadjusted transfers.....	1,070.40	
		\$11,917.17
Cost of work:		
Building cost.....	839,823.73	
Less adjustments.....	\$206.92	
Less accrued revenues.....	3,403.06	
	3,609.98	
		836,213.75
Operation and maintenance cost.....	49,666.18	
Less accrued revenues.....	632.57	
		49,033.61
Total assets.....		897,164.53
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	\$911,601.11	
Transfer vouchers received.....	26,613.51	
		\$938,214.62
Collection vouchers.....	71,708.86	
Transfer vouchers issued.....	35,613.38	
		107,322.24
		\$830,892.38
Accounts payable:		
Unpaid labor.....	6,748.72	
Unpaid purchases.....	1,608.15	
Unpaid contract estimates.....	5,738.69	
Unpaid freight and express.....	977.98	
Unpaid passenger fares.....	357.85	
Unredeemed coupon books.....	43.60	
		15,474.99
Repayments accrued:		
Building.....	42,110.34	
Operation and maintenance.....	8,686.82	
		50,797.16
Total liabilities.....		897,164.53



*Feature costs to June 30, 1909, Huntley project***Main canal:**

Earthwork, divisions 1-3 highline and stations 515-530.	\$380,793.71	
Structures, divisions 1-3 highline and stations 515-530.	87,942.63	
Railroad bridges and culverts.....	4,615.26	
		<b>\$473,351.60</b>

**Distributing system:**

Earthwork and structures.....	245,924.83	
Pumping plant.....	70,018.22	
Pryor Creek improvement.....	19,134.39	
		<b>335,077.44</b>

Buildings and grounds: Construction..... 16,366.74

Telephone system: Construction..... 9,041.01

Supplemental construction..... 5,986.94

Total building cost..... 839,823.73

**Operation and maintenance:**

Main canal.....	6,771.08	
Lateral system.....	28,440.51	
Structures.....	1,495.86	
Pumping plant.....	1,162.20	
Buildings and grounds.....	74.63	
Telephone system.....	105.64	
Demonstration farm.....	1,389.80	
Administration.....	9,156.47	
Inventory of unused supplies.....	1,069.99	
		<b>49,666.18</b>

Total building and operation and maintenance cost, as per debit  
in cost of work in statement of assets and liabilities..... 889,489.91

**MARIAS PROJECT**

A detailed description of the Marias project will be found in the sixth annual report. The irrigation plan of the project contemplates the construction of a high earthen dam in the canyon of Marias River and a diversion canal supplying water to about 200,000 acres of land west and south of Havre, Mont. When first investigated, the project was considered as a connecting link between the St. Mary project and the Milk River project, but more recently its development as a separate project has been considered.

The total expenditures to June 30, 1909, amount to \$13,876.76.

**MILK RIVER PROJECT****LOCATION AND CLIMATIC CONDITIONS**

State: Montana.

Counties: Valley and Chouteau.

Townships: 27 to 33 N., Rs. 16 to 40 E., Montana meridian.

Railroads: Great Northern.

Railroad stations: Glasgow, Hinsdale, Saco, Malta, Dodson, Harlem, Chinook, and Havre, Mont.

Average elevation of irrigable area: 2,200 feet above sea level.

Average annual rainfall on irrigable area: 13 inches.

Range of temperature on irrigable area: — 45° to 100° F.

**WATER SUPPLY**

Source of water supply: Milk River.

Area of drainage basin: 4,000 square miles.

Average elevation of drainage basin: 3,000 feet above sea level.

Average annual rainfall on drainage basin: 20 inches.

Annual run-off of drainage basin: Average, 350,000 acre-feet; minimum recorded, 30,000 acre-feet in 1905.

## ENGINEERING DATA FOR COMPLETE PROJECT

Reservoirs: Chain Lakes—area, 13,422 acres; capacity, 437,560 acre-feet; length of spillway, 1,000 feet; elevation of spillway, 85 feet above stream bed. Nelson Lake—area, 6,842 acres; capacity, 190,430 acre-feet; length and elevation of spillway, not determined.

Storage dams: Chain Lakes—type, earthfill; maximum height, 100 feet; length of crest, 2,130 feet; contents, 1,727,000 cubic yards. Nelson Lake—type, earthfill; maximum height, 33 feet; length of crest, 15,135 feet; contents, 911,540 cubic yards.

Diversion dams: Dodson—type, rockfilled crib; maximum height, 26 feet; length, 319 feet. Vandalia—type, rockfilled crib; maximum height, 27 feet; length, not determined.

Length of canals: 90 miles with capacities greater than 300 second-feet; 285 miles with capacities less than 300 and greater than 50 second-feet.

Aggregate length of tunnels: 465 feet.

Aggregate length of dikes: 6,000 feet.

Construction of project authorized: July 1, 1908.

Per cent completed: 8.

## AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 248,000 acres; Dodson south unit, 10,000 acres.

Ownership of irrigable lands (whole project): Public, 115,000 acres; State, 16,000 acres; Indian, 33,000 acres; private, 84,000 acres.

Lands irrigated, season of 1909 (distributing systems under private management): 25,000 acres.

Character of soil of irrigable area: Loam and gumbo.

Principal products: Hay, grain, and vegetables.

Principal markets: Local.

## GENERAL STATEMENT

A detailed description of the Milk River project may be found in the first annual report, and general descriptions of the project and of the progress of work thereon are given in the other annual reports. Briefly, the irrigation plan of this project provides for the utilization of the water of St. Mary River, as outlined under the St. Mary project, in conjunction with the waters of Milk River, by a storage reservoir at Chain Lakes on Milk River about 12 miles northwest of Burnham, Mont., and diversion dams near Chinook, Dodson, and Vandalia, Mont., for diverting water into canals covering lands in the lower Milk River valley.

The Chinook dam will divert water from Milk River into two canals, one on either side of the river, for the irrigation of 100,000 acres of land near Chinook and Harlem, Mont., comprising the Chinook unit; the Dodson dam will divert water on the south side of the river for the irrigation of 130,000 acres of land on both sides of the river near Dodson, Malta, Saco, and Hinsdale, Mont., comprising the Dodson unit; and the Vandalia dam will divert water on both sides of the river for the irrigation of 20,000 acres of land near Glasgow, Mont., comprising the Glasgow unit. The construction of the Dodson unit is in progress.

## DODSON DAM

The construction of Dodson dam and of the concrete headworks of Dodson south canal was conducted by force account throughout the fall and winter of 1908 and 1909. At times severe climatic conditions were experienced, temperatures ranging for about a week

from  $-30^{\circ}$  F. to  $-45^{\circ}$  F., but little time was lost from the work. In order to avoid possible danger to the roadbed of the Great Northern Railway, work was suspended at the end of February, when the dam was completed to the fixed crest, elevation 2,279 feet above sea level, for a length of 152 feet and the remainder, 168 feet in length, was brought to an elevation of 2,273 feet and decked over. It is planned to complete the dam after the subsidence of high water next fall, by which time the railroad will have been raised and protected by riprapping.

The Dodson south canal headworks were completed except backfilling around the abutments and the placing of the steel gates. Award of contract for the construction and delivery of these gates has been made.

#### DODSON SOUTH CANAL

Cooperative construction of the first 9 miles of Dodson south canal was begun in the summer of 1908 and is now in progress. The canal, when completed, will have a capacity of 1,250 second-feet, but the present construction provides a capacity of only 900 second-feet. Because of the necessarily slow progress on a canal of such large capacity, work on the main canal will be stopped temporarily at the end of the first 9 miles below the headworks, and construction by small cash contracts will be commenced on two laterals, known as the river lateral and the foothill lateral, covering 10,000 acres of irrigable land between Point of Rocks and Malta. It is probable that the works will be sufficiently completed to permit the delivery of water through these laterals in the early spring of 1910.

The canal structures are being built by force account. The concrete work for the Point of Rocks controlling works has been completed, and the turnout for the river lateral, the two upper Peoples Creek culverts, and a vitrified pipe culvert at station 203 of the main canal will be constructed in the near future.

At Point of Rocks it is necessary to take the canal through a high bluff in a cut about 40 feet deep on the upper side. The canal section here will be only 7 feet wide on the bottom and will be concrete lined for about 600 feet. On account of the treacherous nature of the material, there is considerable uncertainty as to the work required, and it is believed that this part of the work can be built by force account to advantage.

Farm-unit plats for 10,000 acres of irrigable land south of Milk River and included in T. 30 N., Rs. 27, 28, 29 E., are being prepared.

#### GLASGOW UNIT

In the fall of 1908 investigations of irrigation possibilities in the Glasgow unit were made. A favorable location for Vandalia dam was found in sec. 12, T. 30 N., R. 36 E. The elevation of low water in the river at this point is 2,097 feet above sea level. It is proposed that the water surfaces in the canal shall be at an elevation of 2,125 feet. The canal heading on the south side of the river at Vandalia dam will water about 16,000 acres of land between the headworks and a point about 6 miles east of Glasgow. The total length of this canal will be 16.5 miles and it will have an initial capacity of 200 second-feet. The amount of excavation

required for it will be approximately 560,000 cubic yards. The canal line heading at the north end of the dam has not been surveyed, but it is believed that about 6,000 acres of land can be irrigated by this canal.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

##### *Principal contracts, Milk River project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
224	Mar. 16, 1908	Universal Portland Cement Co.	Cement.....	\$570.00	\$570.00	Oct. 1, 1908
274	Feb. 27, 1909	.....do.....	.....do.....	2,000.00	807.50	Dec. 1, 1909

#### AGRICULTURAL POSSIBILITIES

Most of the soil of the Milk River valley is a sandy loam well adapted to the raising of grains, hay, and vegetables. In some sections a heavier soil is found. This soil is fertile and with thorough cultivation can be made to produce excellent crops. At present a few small private canals in the vicinity of Chinook and Harlem are operated and some ranchers have installed small pumping plants taking water from Milk River with lifts of 15 to 25 feet. Fifty to sixty horsepower boilers and engines with 10-inch centrifugal pumps are often used. Local coal for operating these plants costs about \$3.50 to \$4.50 per ton at the nearest railroad station. Most of the owners of pumping plants will eventually use water from government canals.

The raising of alfalfa is increasing and two cuttings and a grazing crop are produced annually. Alfalfa seed is a profitable crop, the yield on the average being 8 bushels per acre and the selling price \$7 per bushel. A native grass known as blue joint yields from 2 to 3 tons of hay per acre, the current price for which averages about \$10 per ton in the stack. Oats are extensively and successfully raised, the price ranging from \$1.30 to \$2 per hundred pounds. Wheat produces well but is not extensively raised as no flour mills have been established in this locality. Good crops of potatoes are raised, an average yield being 200 bushels per acre. Onions, pumpkins, cucumbers, cabbage, lettuce, tomatoes, beans, and peas are raised successfully. Experiments show that sugar beets may be profitably raised, but no sugar factories have been established.

It is expected that there will always be a good market for forage crops in the Milk River valley, as extending southward 60 miles to Missouri River, and northward 40 miles to the Canadian boundary line is one of the finest range sections in the northwest.

## LANDS AVAILABLE FOR SETTLEMENT

About 10 per cent of the lands of the project are available for entry. These are in general small detached tracts of less than 40 acres in area. A large proportion of the land has not been patented, and entrymen sometimes relinquish their entries for the value of their improvements. Some patented ranches of 160 acres, fenced and with some buildings, without water rights but lying under projected government canals, have been sold for about \$2,000 each.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Milk River project*

ASSETS	
Inventories:	
Government animals.....	\$3,170.00
Equipment in use.....	\$7,796.13
Less depreciation.....	1,741.96
	6,054.17
Storehouse.....	13,183.59
Cash in office safe.....	7.85
Unadjusted transfers.....	1,643.55
Freight and handling undistributed.....	329.62
	\$24,370.78
Cost of work:	
Building cost.....	286,261.50
Less adjustments.....	802.28
	285,459.22
Total assets.....	309,830.00
LIABILITIES	
Investment of the United States:	
Disbursement vouchers.....	\$262,787.43
Transfer vouchers received.....	19,337.12
	\$282,124.55
Collection vouchers.....	1,040.71
Transfer vouchers issued.....	3,811.19
	4,851.90
	\$277,272.65
Accounts payable:	
Unpaid labor.....	2,068.78
Unpaid purchases.....	2,137.43
Unpaid contract estimates.....	26,211.41
Unpaid freight and express.....	1,893.23
Unpaid passenger fares.....	137.90
Unpaid miscellaneous.....	88.60
	32,557.35
Total liabilities.....	309,830.00
<i>Feature costs to June 30, 1909, Milk River project</i>	
Diversion works:	
Dodson dam.....	\$98,278.09
South headworks.....	8,175.30
	\$106,453.39
Canal system:	
Dodson south canal.....	60,736.47
Dodson south canal, distributing.....	9,420.50
Glasgow canal.....	1,302.18
Dodson north canal.....	91.50
	71,550.65
Real estate (rights and property): Lands purchased.....	6,959.25
Buildings: Construction.....	4,760.95
Examination of project as a whole:	
Hydrography.....	12,406.11
Preliminary surveys.....	36,363.34
	48,769.45
Administration of project as a whole: General expense.....	46,853.06
Inventory of unused supplies.....	914.75
Total building cost, as per debit in cost of work in statement of assets and liabilities.....	286,261.50

## ST. MARY PROJECT

### LOCATION AND CLIMATIC CONDITIONS

State: Montana.

County: Teton.

Townships: 34 to 37 N., Rs. 1 to 13 W., Montana meridian.

Railroads: Great Northern; Alberta Railway and Irrigation Company.

Railroad stations: Browning, Mont.; Cardston, Alberta, Canada.

Average elevation of irrigable area: 3,500 feet above sea level.

Average annual rainfall on irrigable area: 15 inches.

Range of temperature on irrigable area:  $-45^{\circ}$  to  $85^{\circ}$  F.

### WATER SUPPLY

Source of water supply: St. Mary River.

Area of drainage basin: 452 square miles.

Average elevation of drainage basin: 6,000 feet above sea level.

Average annual rainfall on drainage basin: 60 inches.

Average annual run-off of drainage basin: 750,000 acre-feet.

### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: St. Mary Lakes—Area, 7,880 acres; capacity, 218,000 acre-feet; length of spillway, 500 feet; elevation of spillway, 31 feet above stream bed.

Storage and diversion dam: St. Mary Lakes—Type, earthfill; maximum height, 44 feet; length of crest, 2,800 feet; contents, 198,000 cubic yards.

Length of canals: 25 miles with capacities greater than 300 second-feet; canals with less than 300 second-feet not designed.

Aggregate length of tunnels: 1,170 second-feet.

Construction of project authorized: March 25, 1905.

Per cent completed: 18.

### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 100,000 acres.

Ownership of irrigable lands (whole project): Public, 69,000 acres; State, 6,000 acres; private, 25,000 acres.

Character of soil of irrigable area: Loam.

Principal products: Forage and grain.

Principal markets: Local.

### GENERAL STATEMENT

A detailed description of the St. Mary project may be found in the sixth annual report, and general descriptions of the project and of the progress of work thereon are given in the other annual reports. The irrigation plan of the project provides for a dam at the outlet of lower St. Mary Lake, converting it into a storage reservoir, and a canal 25 miles long heading at this reservoir and conducting water to North Fork of Milk River. The water thus diverted will enter Canada, through which country it will flow for 100 miles or more and then return to the United States. A plan for utilizing this water in the lower Milk River Valley is described under Milk River project. A small portion of the diversion canal has been excavated, and the other features of the project remain to be constructed.

### INTERNATIONAL FEATURES

Negotiations with Canada, through the British ambassador, relating to international control of the St. Mary and Milk rivers, which have been in progress for several years, have been continued and a general water-boundary treaty is now under consideration and will doubtless be promulgated in the near future.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, St. Mary project*

## ASSETS

<b>Inventories:</b>			
Equipment in use.....		\$26,370.57	
Storehouse.....		7,559.01	
Lumber.....		1,757.25	
Unadjusted transfers.....		2360.79	
Freight and handling undistributed.....		5,366.17	
			\$40,692.21
<b>Cost of work:</b>			
Building cost.....	\$204,740.38		
Plus adjustments.....	2,319.83		
		207,060.21	
Less accrued revenues.....		347.62	
			206,712.59
<b>Total assets.....</b>			<b>247,404.80</b>

## LIABILITIES

<b>Investment of the United States:</b>			
Disbursement vouchers.....	\$258,399.12		
Transfer vouchers received.....	9,798.05		
		\$268,197.17	
Collection vouchers.....	7,108.09		
Transfer vouchers issued.....	15,292.22		
		22,400.31	
			\$245,796.86
<b>Accounts payable:</b>			
Unpaid labor.....		1,155.62	
Unpaid purchases.....		245.23	
Unpaid freight and express.....		81.26	
Unpaid passenger fares.....		4.85	
Unpaid miscellaneous.....		120.88	
			1,607.94
<b>Total liabilities.....</b>			<b>247,404.80</b>

*Feature costs to June 30, 1909, St. Mary project*

<b>Canal system: Main canal.....</b>			<b>\$76,017.83</b>
<b>Buildings: Construction.....</b>			<b>19,536.42</b>
<b>Real estate (rights and property): Lands purchased.....</b>			<b>14,253.75</b>
<b>Roads and highways:</b>			
Browning-St. Mary.....	\$11,524.05		
Sawmill-canal.....	589.37		
Cardston.....	3,973.90		
			16,087.32
Telephone line: Construction.....			1,686.75
Coal mine: Development.....			2,593.90
Waterworks: Construction.....			1,248.04
<b>Examination of project as a whole:</b>			
Hydrography.....	2,347.05		
Surveys.....	34,174.59		
			36,521.64
<b>Administration of project as a whole: General expense.....</b>			<b>33,678.52</b>
<b>Blackfeet Indian Reservation: Surveys.....</b>			<b>1,802.57</b>
<b>Inventory of unused supplies.....</b>			<b>1,313.64</b>
<b>Total building cost as per debit in cost of work in statement of assets and liabilities.....</b>			<b>204,740.38</b>

## SUN RIVER PROJECT

## LOCATION AND CLIMATIC CONDITIONS

State: Montana.  
 Counties: Teton, Lewis and Clark, Choteau, Cascade.  
 Townships: 20 to 25 N., Rs. 3 E. to 8 W., Montana meridian.  
 Railroad: Great Northern.  
 Railroad stations: Vaughn, Power, Dutton, and Collins, Mont.  
 Average elevation of irrigable area: 3,700 feet above sea level.  
 Average annual rainfall on irrigable area: 12 inches.  
 Range of temperature on irrigable area: -40° F. to 100° F.

\* This is a credit amount.

## WATER SUPPLY

Source of water supply: Sun River and tributaries, and Deep Creek.  
Area of drainage basin: 1,140 square miles.  
Average elevation of drainage basin: 6,000 feet above sea level.  
Average annual rainfall on drainage basin: Unknown.  
Average annual run-off of drainage basin: 700,000 acre-feet.

## ENGINEERING DATA

Reservoir: Willow Creek—area, 2,285 acres; capacity, 84,000 acre-feet; length of spillway, 1,300 feet; elevation of spillway, 100 feet above stream bed.  
Storage dam: Willow Creek; type, hydraulic fill; maximum height, 110 feet; length of crest, 1,045 feet; contents, 437,000 cubic yards.  
Length of canals, Fort Shaw unit: 0.3 mile with capacities greater than 300 second-feet; 17 miles with capacities less than 300 and greater than 50 second-feet; 88 miles with capacities less than 50 second-feet.  
Aggregate length of tunnels: 12,600 feet.  
Aggregate length of dikes: 2,700 feet.  
Construction of project authorized: February 26, 1906.  
Per cent completed: Entire project, 6; Fort Shaw unit, 99.

## AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 276,000 acres; Fort Shaw unit, 16,000 acres.  
Ownership of irrigable lands (whole project): Public, 180,000 acres; State, 22,000 acres; private, 74,000 acres.  
Lands irrigated, season of 1909: 6,500 acres.  
Character of soil of irrigable area: Sandy loam, clay, adobe, and alluvium.  
Duty of water: 2 acre-feet per acre per annum at the farm.  
Principal products: Hay, grain, and vegetables.  
Principal markets: Great Falls, Helena, and Butte, Mont.

## LANDS OPENED FOR IRRIGATION

Date of public notice: March 26, 1908.  
Location of lands opened: Tps. 20 and 21 N., Rs. 1 to 3 W., Montana meridian.  
Irrigable area opened: Public, 12,433 acres; State, 377 acres; private, 1,984 acres.  
Limit of area of farm units: 160 acres.  
Building charge per acre of irrigable land: \$30.  
Annual operation and maintenance charge: \$0.50 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Sun River project may be found in the fourth annual report and of the Fort Shaw unit in the fifth annual report and general descriptions thereof and of the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for a storage reservoir on North Fork of Sun River controlled by the Warm Springs dam, storing the flow of this branch of Sun River; a diversion dam on South Fork of Sun River diverting water into a supply canal discharging into the Warm Springs reservoir; a diversion dam on Sun River about 12 miles below the Warm Springs reservoir diverting water into two canals, one, on the north side of the river, serving as a supply canal to the Pishkun reservoir, the other, on the south side of the river, serving as a supply canal for the Willow Creek reservoir; and the construction of the Pishkun and Willow Creek reservoirs with their subsidiary canal systems. Part of the water supplied to the Pishkun reservoir will be used for the irrigation of the high lands north of Sun River, and the remainder will be discharged into Deep Creek, a tributary of Teton River, from which a dam will divert water for the irrigation of lands



on the southern slope of the Teton River basin. The water stored in the Willow Creek reservoir will be discharged into Sun River and diverted through concrete headworks without a diversion dam into a canal on the south side of Sun River for the irrigation of 16,000 acres in the vicinity of Fort Shaw, Mont.

The diverting works and distributing system for the Fort Shaw unit, except a few sublaterals to be built as settlement demands, have been completed. The outlet works for the Willow Creek storage reservoir are partly constructed, and surveys and preliminary investigations for the north side canal system are well advanced.

#### NORTH SIDE CANAL SYSTEM

The only work done on the north side canal system during the fiscal year has been in connection with preparation of farm-unit plats. The early completion of these plats is desired so that homestead entries, of which many have been and are being made, may be made to conform as soon as possible to definite farm units.

#### TOWNSITES

The lots in the townsites of Fort Shaw and Simms have been put on sale and purchases may be made at the Great Falls land office. Stores have been established at both townsites, lots have been purchased for church buildings, and it is expected that schools will be established this fall.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

##### *Principal contracts, Sun River project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1909.	Completion due.
165	May 6, 1907	Bailey & Dupee.....	Fort Shaw unit, division 5, excavation.	\$19,720.00	\$20,299.17	Aug. 15, 1908
175	May 10, 1907	W. D. Lovell.....	Fort Shaw unit, division 1, excavation.	48,470.00	\$ 56,288.40	June 1, 1908
213	Nov. 20, 1907	Marquette Cement Manufacturing Co.	Cement.....	3,000.00	2,003.76	May 1, 1908
224	Mar. 16, 1908	Universal Portland Cement Co.	.....do.....	180.50	180.50	Oct. 1, 1908

a Completed.

#### SETTLEMENT OF FORT SHAW UNIT

The Fort Shaw unit, containing 16,000 acres of irrigable land, was opened to settlement May 7, 1908. It contains 206 public-land farm units, ranging in area from 40 to 168 acres, of which the largest irrigable area is 115 acres and the smallest 25 acres. The average total area of the farm units is 88 acres and the average irrigable area is 61 acres.

To June 30, 1909, 101 water-right applications have been filed, for an aggregate of 6,573 acres of irrigable land. Many inquiries concerning lands are being received.

It is interesting to note that of the farms taken, 40 per cent contain 40 acres or less of irrigable land; 69 per cent contain 60 acres or less; 90 per cent contain 80 acres or less; and only 10 per cent contain over 80 acres.

#### OPERATION AND MAINTENANCE

Water was run in the Fort Shaw canals from July 21 to October 24, 1908, for the purpose of priming the canals and laterals, but the canals were not put into actual operation until May, 1909. During July and August, 1908, minor repairs on the main canals and the laterals on division 4 necessitated by the flood of June, 1908, were made. No serious breaks occurred during the high-water period of 1909, although its duration was over two months. During the flood season the canal system was operated to its full capacity to relieve the river. Additional sublaterals have been built as fast as a demand for them has arisen and a number of checks have been installed. Where land was properly graded and prepared and farm ditches properly constructed, an adequate supply of water has been furnished for all crops. Some settlers from the humid States have not appreciated the necessity of proper preparation of the land, but are learning by experience; next year they will probably be prepared to utilize the water to better advantage.

About 4 miles of branch telephone lines have been built to connect with canal riders' stations. The chutes where laterals are dropped down hillsides are performing the duties expected of them in a highly satisfactory manner.

#### DEMONSTRATION FARM

A 40-acre demonstration farm is being conducted adjacent to the town of Simms. The whole tract is in cultivation, the crops planted consisting of oats, wheat, field peas, millet, potatoes, sugar beets, and vegetables. The State Nursery Company, of Helena, and the Missoula Nursery Company donated a number of apple and plum trees. Of these, 70 were set out at Simms and 35 at Fort Shaw, and all but about half a dozen are in thrifty condition. Broad-leaf cottonwoods have been planted on two sides of the demonstration farm and around the buildings at Simms and Fort Shaw.

An assistant superintendent of irrigation has charge of operations at the demonstration farm, and gives advice to the settlers, aiding them in planning their farm distributaries and leveling their fields, advising as to time and amount of irrigation, and otherwise assisting them in becoming acquainted with local conditions and requirements.

#### AGRICULTURAL DEVELOPMENT

Only one farm was cultivated during the season of 1908. This contains 25 acres of winter wheat, which promises a good yield this summer. A few of the new settlers were on their farms in time

to get fall plowing done, but the larger number did not arrive until the spring of 1909. Considering the drawbacks incident to building houses, barns, and fences; breaking sod; leveling, seeding and ditching, all in the first season, the Fort Shaw farmers are making an excellent showing. The crops, which consist mostly of oats, wheat, and potatoes, are doing well. Over two carloads of seed potatoes have been planted. Small plots of sugar beets have been planted, but, as all of the fields are newly broken sod, large yields are not expected this year.

Oats usually sell for about \$1 per hundred pounds in this vicinity, and potatoes for \$0.80 to \$1.50 per hundred pounds.

Average yields, in bushels, per acre are as follows: Wheat, 28; oats, 46; barley, 40; flax, 14; rye, 24; potatoes, 175. Alfalfa averages about 5 tons per acre and is worth \$5 to \$15 per ton.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Sun River project*

ASSETS		
Accounts receivable:		
Uncollected miscellaneous	\$45.94	
Uncollected water-right building charges	1,430.15	
Uncollected water-right operation and maintenance charges	238.02	
		\$1,714.11
Inventories:		
Mercantile store	111.85	
Government animals	\$5,592.43	
Less depreciation	2,984.75	
	2,607.68	
Equipment in use	7,486.07	
Less depreciation	531.23	
	6,954.84	
Storehouse	2,060.81	
Cement	781.01	
Iron and steel	583.10	
Lumber	5,574.52	
Explosives	795.87	
Forage	133.17	
Fuel	256.56	
Unadjusted transfers	3,758.43	
Freight and handling, undistributed	31.22	
		23,649.06
Cost of work:		
Building cost	\$480,513.71	
Plus adjustments	164.87	
	480,678.58	
Less accrued revenues	3,209.36	
		477,469.22
Operation and maintenance cost		21,273.83
Total assets		524,106.22
LIABILITIES		
Investment of the United States:		
Disbursement vouchers	\$511,512.94	
Transfer vouchers received	16,526.52	
	\$528,039.46	
Collection vouchers	25,442.01	
Transfer vouchers issued	7,696.11	
	33,138.12	
		\$494,901.34
Accounts payable:		
Unpaid labor	3,695.92	
Unpaid purchases	2,943.98	
Unpaid freight and express	282.09	
Unpaid passenger fares	13.70	
Unpaid miscellaneous	335.50	
		7,271.19
Repayments accrued:		
Building	18,800.60	
Operation and maintenance	3,133.09	
		21,933.69
Total liabilities		524,106.22

*Feature costs to June 30, 1909, Sun River project*

## Storage works:

Willow Creek dam.....	\$515. 41	
Willow Creek outlet tunnel.....	16, 273. 96	
Driving and timbering shaft.....	2, 941. 31	
		\$19, 730. 68

Diversion works: Canal headworks..... 17, 618. 17

## Canal system:

Main canal, division 1.....	\$83, 053. 30	
Main canal, division 2.....	46, 017. 36	
Willow Creek supply canal.....	160. 76	
Lateral system.....	160, 533. 27	
Simms Creek siphon, part of main canal, division 1.....	36, 759. 20	
		326, 523. 89

Telephone system: Construction..... 5, 999. 45

Real estate (rights and property): Lands purchased..... 14, 267. 44

Irrigable lands: Farm-unit subdivision and soil examination..... 1, 151. 89

Buildings: Construction..... 15, 413. 58

North side surveys, preliminary..... 73, 281. 66

Operating accounts..... 818. 39

Examination of project as a whole: Hydrography..... 5, 482. 12

Inventory of unused supplies..... 226. 44

Total building cost..... 480, 513. 71

## Operation and maintenance:

Main canal.....	\$9, 136. 83	
Lateral A.....	3, 217. 89	
Lateral C.....	306. 81	
Lateral D.....	65. 10	
Laterals C5, K, and H.....	333. 83	
Miscellaneous structures.....	1, 678. 53	
Publicity and settlement.....	2, 787. 27	
Demonstration farm.....	2, 552. 01	
Instruction and demonstration at Fort Shaw.....	505. 87	
Telephone system.....	689. 69	
		21, 273. 83

Total building and operation and maintenance cost as per debit in  
cost of work in statement of assets and liabilities..... 501, 787. 54

## MONTANA-NORTH DAKOTA LOWER YELLOWSTONE PROJECT

### LOCATION AND CLIMATIC CONDITIONS

Counties: Dawson, Mont.; McKenzie, N. Dak.  
Townships: 18 to 26 N., Rs. 56 to 60 E., Montana meridian; 150 to 152 N., R. 104 W., fifth principal meridian.  
Railroads: Northern Pacific; Great Northern.  
Railroad stations: Glendive and Mondak.  
Average elevation of irrigable area: 1,900 feet above sea level.  
Average annual rainfall on irrigable area: 16 inches.  
Range of temperature on irrigable area:  $-30^{\circ}$  F. to  $100^{\circ}$  F.

### WATER SUPPLY

Source of water supply: Yellowstone River.  
Area of drainage basin: 66,000 square miles.  
Average annual run-off of drainage basin: 10,000,000 acre-feet.

### ENGINEERING DATA FOR COMPLETE PROJECT

Diversion dam: Type, rock-filled timber weir; maximum height, 12 feet; length of crest, 700 feet.  
Length of canals: 38 miles with capacities greater than 300 second-feet; 47 miles with capacities less than 300 and greater than 50 second-feet; 61 miles with capacities less than 50 second-feet.  
Aggregate length of dikes: 5,000 feet.  
Water power: Estimated total, 290 horsepower.  
Construction of project authorized: May 10, 1904.  
Per cent completed: 92.

### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 64,622 acres.  
Ownership of irrigable lands (whole project): Public, 17,794 acres; State, 2,150 acres; railroad, 5,584 acres; private, 39,094 acres.  
Lands irrigated season of 1909: Public, 165 acres; private, 5,385 acres.  
Character of soil of irrigable area: Deep sandy loam.  
Duty of water:  $2\frac{1}{2}$  acre-feet per acre per annum at the farm.  
Principal products: Grain, hay, and vegetables.  
Principal markets: Minneapolis and St. Paul, Minn.; local.

### LANDS OPENED FOR IRRIGATION

Dates of public notices: December 21, 1908; April 24, 1909.  
Location of lands opened: Tps. 18 and 19 N., R. 57 E.; Tps. 19 to 20 N., R. 58 E.; Tps. 21 to 25 N., R. 59 E.; T. 24 N., R. 60 E., Montana meridian. T. 150 N., R. 104 W.; T. 151 N., R. 104 W., fifth principal meridian.  
Irrigable area opened: Public, 7,964 acres; State, railroad, and private, 35,748 acres.  
Limit of area of farm units: Public, 80 acres; private, 160 acres.  
Building charge per acre of irrigable land: \$42.50.  
Annual operation and maintenance charge: \$1 per acre of irrigable land.

### GENERAL STATEMENT

A detailed description of the Lower Yellowstone project may be found in the sixth annual report, and general descriptions of the project and of the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for the diversion of water from Yellowstone River at a point about 18 miles below Glendive, Mont., into a canal on the north side of the river extending to Missouri River at the mouth of Yellowstone River for the irrigation of lands lying between the canal and Yellowstone River. The fall of the water discharged from the main canal into

one of the laterals will be utilized in operating direct-connected turbines and centrifugal pumps for raising water to irrigate 3,000 acres of bench land. The work remaining to be done on the project consists of the construction of the pumping system, extension of the canals and laterals of the gravity system, and about one-half of the construction of Yellowstone dam.

## CONSTRUCTION

The work on contracts covering the excavation of divisions 1 to 8 of the main canal, laterals, waste ditches, the building of fifty-eight highway bridges and various structures on the main canal and laterals, the reconstruction of a part of division 2 of the main canal, and the construction of Linden Creek flume and sluiceway were completed during the fiscal year. Force account work on wooden structures was brought to a close. At Yellowstone dam the contractors refused to continue work at the contract price, and the contract was suspended September 15, 1908. The work on the dam is being continued by force account.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Lower Yellowstone project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1909.	Completion due—
48	July 24, 1905	Chas. Stabern.....	Main canal, divisions 1-3, structures.	\$104,276.35	•\$93,462.29	May 1, 1908
62	Aug. 18, 1905	Illinois Steel Co.....	Cement.....	16,000.00	• 16,257.50	
78	Apr. 20, 1906	John A. Nelson.....	Main canal, divisions 5-9, and laterals A-M, earthwork.	252,770.00	•257,656.83	Sept. 2, 1908
99	Apr. 30, 1906	Henry C. Delaney ..	Main canal, division 4, earthwork.	88,091.00	•101,176.01	June 1, 1908
106	May 12, 1906	D. H. Freeman & Co.	Main canal, division 2, earthwork.	251,516.00	•311,545.55	May 15, 1908
109	May 1, 1906	John A. Nelson.....	Main canal, division 8, and laterals O and P, earthwork.	29,983.00	• 29,698.39	June 24, 1908
110	June 4, 1906	D. H. Freeman & Co.	Main canal, division 1, earthwork.	205,115.00	•286,794.36	Aug. 31, 1908
115	July 26, 1906	Newman & Hoy....	Main canal, division 3, earthwork.	245,038.00	•256,123.41	June 15, 1908
116	Aug. 7, 1906	James Munn.....	Main canal, divisions 5-9, and laterals A-P, structures.	205,814.50	•199,303.07	Dec. 1, 1908
133	Sept. 21, 1906	Pacific Coast Construction Co.	Lower Yellowstone dam.	142,825.00	• 82,540.95	Feb. 1, 1909
157	Apr. 6, 1907	Arthur Coates & Co.	Laterals and waste ditches.	112,011.00	•109,938.56	Sept. 1, 1908
162	Apr. 19, 1907	Pittsburgh Manufacturing Co.	Sluice gates for turn-outs.	4,895.06	• 6,709.07	June 8, 1908
196	July 18, 1907	A. Y. Bayne & Co....	Highway bridges.....	7,026.70	• 6,969.01	June 1, 1908
206	Aug. 20, 1907	James Munn.....	Structures, headworks to Newlon.	64,937.50	35,651.11	Nov. 30, 1908
213	Nov. 20, 1907	Marquette Cement Manufacturing Co.	Cement.....	3,000.00	2,003.76	May 1, 1908
218	Feb. 17, 1908	Minneapolis Steel and Machinery Co.	Highway bridges.....	17,885.00	• 17,774.77	Nov. 1, 1908
219	Feb. 11, 1908	A. Y. Bayne & Co....	.....do.....	17,389.00	• 17,389.00	June 15, 1908
224	Mar. 16, 1908	Universal Portland Cement Co.	Cement.....	1,942.75	1,942.75	Oct. 1, 1908
233	Apr. 25, 1908	John S. Penson.....	Bridge abutments.....	10,877.75	• 10,281.46	Do.
235	May 6, 1908	.....do.....	Lateral turn-outs.....	7,687.80	• 7,176.62	Oct. 15, 1908
243	May 15, 1908	James Burton.....	Linden Creek flume and sluiceway.	11,052.00	• 13,624.27	Oct. 1, 1908
253	Sept. 24, 1908	Wm. J. Hoy.....	Main canal, division 2.	2,969.50	• 3,184.66	Nov. 17, 1908

• Completed.

• Suspended.

## PUBLIC NOTICE DATED DECEMBER 21, 1908

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the Lower Yellowstone project, Montana-North Dakota, under the provisions of the reclamation act, in the irrigation season of 1909 for the irrigable land shown on farm-unit plats of T. 18 N., R. 57 E.; T. 19 N., R. 57 E.; T. 19 N., R. 58 E.; T. 20 N., R. 58 E.; T. 21 N., R. 58 E.; T. 21 N., R. 59 E.; T. 22 N., R. 58 E.; T. 22 N., R. 59 E.; T. 23 N., R. 59 E.; T. 24 N., R. 59 E.; T. 24 N., R. 60 E.; T. 25 N., R. 59 E., Montana meridian; T. 150 N., R. 104 W.; T. 151 N., R. 104 W., fifth principal meridian; approved December 9, 1908, by the Secretary of the Interior, and on file in the local land offices at Miles City and Glasgow, Mont., and Williston, N. Dak.

Homestead entries, accompanied by applications for water rights and the first installment of the building and operation and maintenance charges, may be made under the provisions of said act for the farm units shown on the said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

The limit of area per entry, representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown upon the plats for the several farm units.

The limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership which can be irrigated by the waters from the said irrigation project are in two parts, as follows:

1. The building of the irrigation system, \$42.50 per acre of irrigable land, payable in not more than ten annual installments, each not less than \$4.25 per acre, or some multiple thereof, provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not. The operation and maintenance charge for the irrigation season of 1909, and until further notice, will be \$1 per acre of irrigable land, whether water is used thereon or not.

For lands hereafter entered the first installment on account of the said charges for the irrigable lands shown on these plats shall be paid for the season of 1909 at the local land office at Miles City, Mont.; Glasgow, Mont., or Williston, N. Dak., at the time of entry and of filing water-right application, the total payment being not less than \$5.25 per acre. The second installment shall be due and payable on December 1 of the following year at the same place. Subsequent installments shall be due and payable on December 1 of each year at the same place.

For lands in private ownership and for lands heretofore entered, the first installment shall be due and payable December 1, 1909, and the installments for 1910 and subsequent years shall be due and payable on the same date and at the same place.

The first installment of the charges for all irrigable areas shown on these plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable as herein provided.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly, no water will be furnished for the irrigation season of 1910 for any lands unless the portion of the installment for operation and maintenance due and payable on or before December 1, 1909, has been paid on or before April 1, 1910, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before April 1 of that year of the portion of the installment for operation and maintenance which was due and payable on December 1 of the preceding year.

For all applications for water rights filed after June 15 in 1909, or any subsequent year, one installment of the charge for building, operation, and maintenance, \$5.25 per acre, must be paid at the time of filing, but the portion of the installment for operation and maintenance shall be credited on account of the installment of said charges for the subsequent year.

If any installment of the charges shall not have been paid in full on or before December 1 of the year subsequent to that in which it is due and payable as herein provided, it shall then become delinquent and under the terms of section 5 of the reclamation

act the entry and water-right application shall be subject to cancellation, with the forfeiture of any moneys paid thereon.

The charges herein provided for may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the Lower Yellowstone project for transmission to the register and receiver of the local land office at Miles City, Mont.; Glasgow, Mont., or Williston, N. Dak., on or before the dates specified for payments at the local land offices; but in case this privilege is availed of, the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

The notice was forwarded with the plats to the General Land Office for transmission to the register and receiver of the local land offices, with instructions for conforming to the farm units the homestead entries made or to be made under the provisions of the reclamation act; that the local officers give publicity to the notice and announce that water-right applications must be filed in the proper form in the local land office before water will be furnished; that the United States will operate and maintain the diversion works and main canals, as shown on a plat of the project approved by the Director of the Reclamation Service, a copy of which is on file with the engineer in charge of the project, the cost thereof to be included in the operation and maintenance charges for the project; that the amount of water to be furnished is 2.5 acre-feet per acre per annum; that the building charge and number of annual installments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence in the neighborhood has been fixed at 20 miles; and that the Secretary of the Interior has entered into a contract with the Lower Yellowstone Water Users' Association, and the certificate of that association forming part of the water-right application must be filled in before the application can be accepted.

#### PUBLIC NOTICE DATED APRIL 24, 1909.

In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L. 388), public notice was issued on December 21, 1908, announcing that water will be furnished from the Lower Yellowstone project, Montana-North Dakota, under the provisions of said act for the irrigable lands shown on farm-unit plats of T. 18 N., R. 57 E.; T. 19 N., R. 57 E.; T. 19 N., R. 58 E.; T. 20 N., R. 58 E.; T. 21 N., R. 58 E.; T. 21 N., R. 59 E.; T. 22 N., R. 58 E.; T. 22 N., R. 59 E.; T. 23 N., R. 59 E.; T. 24 N., R. 59 E.; T. 24 N., R. 60 E.; T. 25 N., R. 59 E., Montana meridian; T. 150 N., R. 104 W.; T. 151 N., R. 104 W. fifth principal meridian, approved by the Secretary of the Interior on December 9, 1908, and on file in the local offices at Miles City and Glasgow, Mont., and Williston, N. Dak.

It has been found impracticable to furnish water in 1909 as contemplated to all the irrigable lands in the farm-units shown on the approved plats.

Therefore until further notice the irrigable acreages of the several tracts shown on the approved farm-unit plats shall be temporarily reduced to the areas shown on the lists for the various townships as approved by the Secretary of the Interior, and filed in the proper local land office.

All water-right applications shall be filed in accordance with the public notice of December 21, 1908, and shall conform to the irrigable acreages shown on the approved farm-unit plats; but payments of the building operation and maintenance charges may until further notice be made on the basis of the diminished acreages shown on the said approved lists. The time when the payments shall commence on the remainder of the irrigable acreages in the several tracts will be hereafter announced.

#### OPERATION AND MAINTENANCE

For operation the project is divided into three lateral districts and about eighteen canal and lateral divisions. The canals and laterals were prepared for delivery of water early in the spring of 1909.



Five checks were built in the main canal and about fifty in the laterals; and some of the laterals had to be extended or the banks raised in order to deliver water effectively to all irrigable lands included in the farm units.

Water was turned into the main canal on April 30, 1909. The work done on the slides on divisions 1 and 2 held well, but the water damaged the heavy gravel banks and sidehill work below Tokna. Considerable work that has been done and the silting effect of the muddy water is making this section of the canal reasonably safe. A number of incipient breaks have been handled so as to avoid actual breaks, and the canal has been kept in condition to deliver water to all the lands at present signed for water. On May 31 the farmers were notified that there was an abundant supply of water for irrigation, and by June 30, of 285 landowners and 88 entrymen, 78 landowners and 43 entrymen had made application for water for an aggregate of 11,296 acres of land.

The water users have been given assistance and advice in preparing their lands for irrigation and laying out the head ditches. A large number have availed themselves of this help, and will make an unusually good showing for first year's irrigation in a new district.

The buildings and grounds at the different district headquarters are being improved and adapted to the new conditions. A demonstration farm is being operated at Newlon, and the lands at the other district headquarters are being utilized in raising grain and garden produce.

The telephone system has been extended to meet the requirements of operation.

#### SETTLEMENT

There are about 31 farm units, with a total area of 2,487 acres, and an irrigable area of 1,849 acres open to entry, and several thousand acres of excess holdings of private lands are on sale. The private lands are now held at comparatively low prices.

#### FINANCIAL STATUS

##### *Assets and liabilities on June 30, 1909, Lower Yellowstone project*

ASSETS.		
<b>Accounts receivable:</b>		
Uncollected freight refunds.....	\$1,933.90	
Uncollected miscellaneous.....	12,940.77	
Uncollected water-right building charges.....	47,769.87	
Uncollected water-right operation and maintenance charges.....	11,239.97	
		<b>\$73,884.51</b>
<b>Inventories:</b>		
Government animals.....	5,006.00	
Equipment in use.....	11,765.39	
Storehouse.....	1,682.26	
Cement.....	213.04	
Iron and steel.....	6,324.44	
Lumber.....	1,687.53	
Fuel.....	109.75	
Local products.....	570.84	
Unadjusted transfers.....	2,022.78	
Freight and handling undistributed.....	335.82	
		<b>29,718.75</b>
<b>Cost of work:</b>		
Building cost.....	\$2,594,419.51	
Plus adjustments.....	4,560.13	
		<b>2,598,979.64</b>
Less accrued revenues.....	20,023.06	
		<b>2,578,956.58</b>
Operation and maintenance cost.....		<b>51,080.95</b>
<b>Total assets.....</b>		<b>2,733,640.79</b>

## LIABILITIES.

Investment of the United States:			
Disbursement vouchers.....	\$2,591,639.08		
Transfer vouchers received.....	62,080.74		
		\$2,653,719.82	
Collection vouchers.....	20,917.56		
Transfer vouchers issued.....	9,856.83		
		30,774.39	
Accounts payable:			\$2,622,945.43
Unpaid labor.....	14,066.94		
Unpaid purchases.....	7,219.85		
Unpaid contract estimates.....	952.20		
Unpaid contract holdbacks.....	17,448.96		
Unpaid freight and express.....	7,650.96		
Unpaid passenger fares.....	3.05		
Unpaid land agreements.....	3,288.51		
Unpaid miscellaneous.....	761.05		
			51,391.52
Repayments accrued:			
Building.....	48,007.87		
Operation and maintenance.....	11,295.97		
			59,303.84
Total liabilities.....			2,733,640.79

*Feature costs to June 30, 1909, Lower Yellowstone project*

Diversion works, Lower Yellowstone dam.....			\$160,523.05
Canal system:			
Earthwork.....	\$1,411,275.44		
Structures.....	576,548.86		
		1,987,824.30	
Distributing system:			
Earthwork.....	210,431.67		
Structures.....	20,827.34		
		231,259.01	
Highway bridges:			
Bridge No. 3.....	8,643.69		
Bridges, force account.....	2,959.06		
Bridges, schedule 1.....	22,562.20		
Bridges, schedules 2 and 3.....	22,357.82		
Wooden structures, headworks to Newlon.....	14,002.42		
Approaches.....	4,275.98		
		74,801.17	
Real estate (rights and property): Land purchased.....			27,876.64
Buildings:			
Construction.....	17,895.32		
Maintenance.....	266.71		
		18,162.03	
Telephone system:			
Construction.....	19,184.50		
Maintenance.....	4,532.82		
		23,717.32	
Irrigable lands:			
Land surveys.....	12,450.01		
Soil surveys.....	1,890.55		
Farm-unit subdivision.....	1,016.24		
		15,356.80	
Examination of project as a whole:			
Reconnaissance.....	20,442.76		
Preliminary surveys.....	30,009.98		
		50,452.74	
Administration of project as a whole: General expense.....			4,446.45
Total building cost.....			2,594,419.51
Operation and maintenance:			
Main canal, earthwork.....	7,961.40		
Main canal, structures.....	3,739.51		
Lateral system.....	13,006.98		
Demonstration farms.....	1,675.99		
Telephone system.....	2,230.58		
Buildings and grounds.....	5,407.44		
Administration charges.....	17,059.05		
		51,080.95	

Total building and operation and maintenance cost, as per debit  
in cost of work in statement of assets and liabilities..... 2,645,500.46

## NEBRASKA-WYOMING

### NORTH PLATTE PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

Counties: Sioux, Scotts Bluff, Banner, and Cheyenne, Nebr.; Natrona, Carbon, Converse, and Laramie, Wyo.

Townships: 19 to 27 N., Rs. 48 to 67 W.; 26 to 30 N., Rs. 83 to 85 W., sixth principal meridian.

Railroads: Chicago, Burlington and Quincy; Union Pacific; Chicago and North-western.

Railroad stations: Bridgeport, Bayard, Minatare, Scottsbluff, Mitchell, Morrill, and Henry, Nebr.; Torrington, Vaughn, Wyncote, Fort Laramie, Guernsey, and Casper, Wyo.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area: 15 inches.

Range of temperature on irrigable area:  $-25^{\circ}$  F. to  $100^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: North Platte River.

Area of drainage basin: 12,000 square miles.

Average elevation of drainage basin: 8,500 feet above sea level.

Average annual rainfall on drainage basin: 20 inches.

Average annual run-off of drainage basin: 1,500,000 acre-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Pathfinder—area, 21,774 acres; capacity, 1,025,000 acre-feet; length of spillway, 660 feet; elevation of spillway, 182 feet above stream bed.

Storage dam: Pathfinder—type, broken range cyclopean rubble masonry arch; maximum height, 218 feet; length of crest, 432 feet; contents, 60,712 cubic yards.

Diversion dams: Whalen—type, reinforced concrete weir; maximum height, 25 feet; length of masonry, 300 feet; length of earthfill, 2,000 feet. Guernsey—not designed.

Length of canals: 95 miles with capacities greater than 300 second-feet; 23 miles with capacities less than 300 and greater than 50 second-feet; 385 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 480 feet.

Aggregate length of dikes: 2,000 feet.

Construction of project authorized: May 3, 1903.

Per cent completed: 74.

#### AGRICULTURAL CONDITIONS, INTERSTATE CANAL UNIT

Irrigable area: 129,000 acres (Nebraska, 107,000 acres; Wyoming, 22,000 acres).

Ownership of irrigable lands: Public, 85,500 acres; State, 8,800 acres; private, 34,700 acres.

Lands irrigated season of 1909: Public, 28,162 acres; private, 16,100 acres; (Nebraska, 34,262 acres; Wyoming, 10,000 acres).

Character of soil of irrigable area: Sandy loam.

Duty of water:  $2\frac{1}{2}$  acre-feet per acre per annum at the farm.

Principal products: Alfalfa, cereals, corn, sugar beets, potatoes.

Principal markets: Omaha, Nebr.; Kansas City and St. Joseph, Mo.; Denver, Colo.; central Wyoming.

## LANDS OPENED FOR IRRIGATION

Dates of public notices and orders relating thereto: July 29, 1907; May 29, 1908; June 16, 1908; November 12, 1908; March 3, 1909; March 27, 1909; and June 2, 1909. Location of lands opened: Tps. 22 to 26 N., Rs. 53 to 60 W., sixth principal meridian. Irrigable area opened: Public, 49,268 acres; State, 3,346 acres; private, 16,050 acres. Limit of area of farm units: Public, 80 acres; private, 160 acres. Building charge per acre of irrigable land: \$35 and \$45. Annual operation and maintenance charge: \$2 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the North Platte project may be found in the fourth annual report, and general descriptions thereof and of the progress of the work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for a storage reservoir controlled by Pathfinder dam on North Platte River, in Wyoming, at a point about 3 miles below the junction of the North Platte and Sweetwater rivers, and 50 miles southwest of Casper, Wyo.; a diversion dam on North Platte River at Whalen, Wyo., 8 miles below Guernsey, Wyo.; Interstate canal heading at Whalen dam, and extending east on the north side of the river to a point near Bridgeport, Nebr.; Fort Laramie canal, heading at Whalen dam and extending southeast on the south side of the river to a point near Gering, Nebr., and a dam on North Platte River a short distance above Guernsey, Wyo., diverting water into Goshen Hole canal for the irrigation of lands in Goshen Hole on the south side of the river. Pathfinder dam and Whalen dam have been constructed and Interstate canal has been completed for a distance of 95 miles from Whalen, Wyo.

## PATHFINDER DAM

The contractors for the construction of Pathfinder dam commenced work September 25, 1905, but it was August 15, 1906, before the first stone was laid. On June 30, 1908, the dam had been constructed to a height of 119 feet above the lowest point in the foundation, and 38,527 cubic yards of masonry had been placed. During the fiscal year 22,185 cubic yards of masonry were placed, the last stone being laid June 5, and the contract was completed June 14, 1909.

The body of the dam is constructed of broken range cyclopean rubble composed of a hard, coarse-grained granite, quarried at the dam site. The greater part of this granite was quarried so as to leave a spillway 660 feet long at the north end of the dam. In order to get suitable face stones, however, two additional quarries were opened nearby. Both faces of the dam were laid up in courses, the stones being selected and cut so as to lie with horizontal beds and vertical joints. No mortar joint in either face exceeded 2 inches in thickness. All stones were set in a heavy bed of Portland cement mortar, and in the body of the dam the vertical joints were filled with concrete. The construction of the dam and auxiliary structures has required 56,500 barrels of cement, all of which has been hauled by teams from Casper, Wyo., a distance of 45 miles.

During the flood season of 1909, the reservoir was filled to elevation 5,835 feet above sea level, which is 189 feet above the lowest point in the foundation of the dam; and at the end of the fiscal year the reservoir contained 740,000 acre-feet of water.

## HIGH-PRESSURE GATES

The installation of the high-pressure gates was completed in April, 1908, but the gatehouse not having been built, the gate operating machinery could not be installed at that time. The foundation for the gatehouse was part of the contract for the construction of the dam, and was finished by the contractors in November, 1908. The gatehouse was built by force account, and was completed in April, 1909. The installation of the gate-operating machinery is now complete and the gates have worked satisfactorily under low heads. Tests under high heads will be undertaken in the near future.

## GRILLAGES

During the past winter grillages were placed at the entrances to the tunnel and to the three openings through the dam. The grillages for the openings consist of simple round iron rods, but the grillage at the entrance to the tunnel is a more complicated structure, being composed of reinforced concrete beams and columns supporting 1½-inch by 6-inch steel grillage bars. The concrete beams supporting the vertical grillage bars divide the structure into three stories, above which is a conical-shaped top of grillage bars, the whole resting against the canyon wall above the entrance to the tunnel. The waterway opening in the tunnel grillage is 339 square feet in area and the gate opening is 82 square feet.

## DIVERSION DAM AND HEADWORKS

On May 29, 1908, a portion of the cofferdam surrounding the works for the construction of the Whalen diversion dam and headworks was undermined by the water in the diversion channel and a large part of the plant was inundated. The contractor failing to resume the work, the contract was suspended on August 18, 1908, and its completion was undertaken by force account. The concrete work was completed about December 30, 1908, and the dike and gravel cover in February, 1909.

## INTERSTATE CANAL AND DISTRIBUTING SYSTEM

The Interstate canal is now completed for a distance of 95 miles from Whalen, Wyo., to a point 10 miles north and 1 mile east of Scottsbluff, Nebr. In order to control the velocity of the water, to supply high lands adjacent to the canal, and to facilitate operation in case of breaks, 19 check gates were built in the main canal during the year. Various betterments were made on existing cross-drainage structures and wasteways and about 15 high-line outlets were built along the line of the main canal. The territory under the first division of the main canal in Wyoming, in which is located the Carey selection of the North Platte Canal and Colonization Company, was surveyed in the spring of 1909 to determine the irrigable acreage controlled by this company.

In the first lateral district many miscellaneous wooden lateral structures and lateral extensions, involving about 50,000 cubic yards of excavation, were constructed.

During the fiscal year the construction of the lateral structures in the second lateral district was authorized and carried practically to completion. This involved the building of about 300 small concrete structures, such as drops, diversion gates, bridges, flumes, wasteways, and underdrains. In addition, about 700 wooden lateral structures, such as weirs, measuring flumes, drops, checks, and farmers' lateral head-gates were built. Lateral extensions, requiring about 90,000 cubic yards of earth excavation, were constructed.

The surveys of land lines, irrigable areas, and lateral extensions and the preparation of farm-unit plats were carried to completion during the fiscal year. The distribution system of the second lateral district is now completed, with the exception of some isolated farm lateral extensions and the building of about 400 small wooden structures for which there is no present need.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

##### *Principal contracts, North Platte project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
63	Sept. 1, 1905	Geddis & Seerie Stone Co.	Pathfinder dam.....	\$582,000.00	α\$625,924.52	Aug. 1, 1909
77	Dec. 6, 1905	Portland Cement Co...	Cement.....	14,000.00	α 14,133.31	
150	Feb. 14, 1907	New Jersey Foundry and Machine Co.	High-pressure gates.....	68,000.00	α 68,461.65	Apr. 1, 1908
151	Feb. 15, 1907	S. R. H. Robinson & Sons Co.	Diversion dam and headworks.....	217,850.00	β147,800.31	Apr. 11, 1908
213	Nov. 20, 1907	Marquette Cement Manufacturing Co.	Cement.....	6,000.00	4,836.89	May 1, 1908
216	Dec. 27, 1907	Fairbanks, Morse & Co.	Gasoline engine.....	637.00	α 637.00	Feb. 3, 1908
220	Mar. 3, 1908	Marquette Cement Manufacturing Co.	Cement.....		324.47	
224	Mar. 16, 1908	Universal Portland Cement Co.	.....do.....	6,184.50	6,184.50	Oct. 1, 1908
225	Mar. 18, 1908	Northern Electrical Manufacturing Co.	Generators and switchboards.....	400.00	α 400.00	Apr. 26, 1908
230	Apr. 1, 1908	Portland Cement Co.	Cement.....	8,260.00	9,134.54	Oct. 1, 1908
258	Oct. 1, 1908	Iola Portland Cement Co.	.....do.....	2,000.00	2,809.60	June 1, 1909
273	Feb. 25, 1909	.....do.....	.....do.....		260.00	Dec. 1, 1909

α Completed.

β Suspended.

#### PUBLIC NOTICE DATED NOVEMBER 12, 1908

In connection with the North Platte project, Nebraska-Wyoming, constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat. L., 388), it is hereby ordered that all entries hereafter made for farm units shown upon approved plats issued with the public notice for said project must be accompanied by a water-right application and the installment of the charge for building, operation, and maintenance due December 1, 1908. The subsequent installments and portions of installments shall be due and payable in accordance with notices and orders heretofore or hereafter issued by the Secretary of the Interior.

The foregoing notice was transmitted to the Commissioner of the General Land Office for transmission to the proper local land offices with instructions for putting into effect the provisions of the notice and for its publication in the local newspapers.

## PUBLIC NOTICE DATED MARCH 3, 1909

The public notice issued July 29, 1907, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), opening to irrigation lands in the first lateral district of the North Platte project, Nebraska-Wyoming, provides that until further notice the portion of the annual installment for operation and maintenance shall be 40 cents per acre of irrigable land per annum; and by regulations promulgated May 29, 1908, it is provided that the part of the annual installment covering charges due for operation and maintenance must be paid on or before April 1 of each year, in default of which no water will be furnished for the irrigation of such lands.

It is hereby announced that the portion of the water-right charge for operation and maintenance which must be paid on or before April 1, 1909, shall be \$2 per acre of irrigable land.

No water-right application will be accepted hereafter for lands in the first lateral district, except in accordance with following terms:

The charges for building, operation, and maintenance shall be \$45 per acre of irrigable land, plus such additional amounts for operation and maintenance as shall be announced, payable in not more than ten annual installments. Full payment may be made at any time of any balance remaining due after certification by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

Entrymen and private landowners who have heretofore filed water-right applications under the terms of the public notice of July 29, 1907, and who have paid the 40 cents per acre for operation and maintenance for 1908, may, if desired, amend their applications, so that the first installment of the building charge due December 1, 1908, shall be reduced to \$2 per acre; the second installment, \$3 per acre, covering all charges for building, operation, and maintenance, shall become due December 1, 1909. One of the remaining installments, \$5 per acre for the building charge plus such sum as may be hereafter announced as the portion of the installment for operation and maintenance, shall become due on December 1 of each succeeding year for eight years: Provided, that expenses incurred prior to January 1, 1911, for operation and maintenance shall not be charged against lands within the first lateral district for which amended or new water-right applications are filed in accordance with the new rates herein announced.

Entrymen and private landowners who have heretofore filed water-right applications under the terms of the public notice of July 29, 1907, and who have not paid the 40 cents per acre for operation and maintenance for 1908, may, if desired, amend their applications in accordance with the new rates herein announced after payment of the said operation and maintenance charges, and in such case the first installment of the building charge due December 1, 1908, shall be reduced to the amount of the first installment of the charges herein announced, namely, \$2 per acre; the remaining installments becoming due and being of the amount as announced in the preceding paragraph.

All future water-right applications for lands in the first lateral district shall be subject to the new rate herein announced, and must be accompanied by the first installment of the charges, the amount being the same as for applications heretofore filed, \$2.40 per acre of irrigable land. The second installment, \$3 per acre, shall become due December 1, 1909. One of the subsequent installments, \$5 per acre for the building charge plus such sum as may be announced as the portion of the installment for operation and maintenance, shall be due on December 1 of each succeeding year for eight years, subject to the limitation hereinbefore stated.

Entrymen and private landowners desiring to continue under the public notice of July 29, 1907, will be required to pay the charge for operation and maintenance, \$2 per acre, on or before April 1, 1909, as herein announced, and must pay the annual charges due December 1, 1908, and December 1, 1909, and subsequent years for building, operation, and maintenance in accordance with the provisions of the public notice of July 29, 1907.

Under the terms of the notice of July 29, 1907, the first installment of the water-right charges for the land under the first lateral district became due December 1, 1908, and unless the entire installment has been paid in full before December 1, 1909, two payments will then be due and unpaid, rendering the corresponding entry or water-right application, or both, as the case may be, subject to cancellation, with the forfeiture of all rights under the act, as well as any moneys already paid thereon. They will similarly be subject to forfeiture and cancellation in future years.

The charges herein provided for may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the North Platte project, for transmission to the register and receiver of the local land office on

or before the date specified for payment at the local land office; but in case this privilege is availed of, the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

This notice was transmitted to the Commissioner of the General Land Office with instructions that appropriate action be taken for putting the provisions thereof into effect.

PUBLIC NOTICE DATED MARCH 27, 1909

Pursuant to the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the North Platte project, Nebraska-Wyoming, under the provisions of the reclamation act in the irrigation season of 1909 for the irrigable lands in the second lateral district, shown on farm-unit plats of T. 22 N., R. 54 W.; T. 23 N., R. 54 W.; T. 22 N., R. 55 W.; T. 23 N., R. 55 W.; T. 23 N., R. 56 W.; T. 24 N., R. 56 W., sixth principal meridian, approved March 20, 1909, by the Secretary of the Interior and on file in the local land office at Alliance, Nebr.

Homestead entries, accompanied by applications for water-rights and the first installment of the water-right charges, may be made under the provisions of said act for the farm units shown on said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

The limit of area per entry, representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units.

The limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership are as follows:

For building, operation, and maintenance, \$45 per acre of irrigable land, plus such additional amounts for operation and maintenance, beginning with the third annual installment, as shall be hereafter announced, payable in not more than ten annual installments. Full payment may be made at any time of any balance remaining due after certification by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

For lands hereafter entered the first installment on account of said charges for the irrigable lands shown on these plats must be paid at the local land office at the time of entry and filing of water-right application, the total payment being \$2 per acre; the second installment, \$3 per acre, shall be due on December 1 of the following year; one of the subsequent installments, \$5 per acre, plus such amount as may be hereafter announced as the portion of the installment for operation and maintenance, shall be due on December 1 of each succeeding year for eight years.

For lands in private ownership and for lands heretofore entered the first installment, \$2 per acre of irrigable land, shall be due on December 1, 1909; the second installment, \$3 per acre, shall be due on December 1, 1910; one of the subsequent installments, \$5 per acre, plus such sum as may be hereafter announced as the portion of the installment for operation and maintenance, shall be due on December 1 of each succeeding year for eight years.

Failure to pay any two installments of the charges when due, whether on entries made subject to the reclamation act, or on water-right applications for other lands, shall render such entries and the corresponding water-right applications, if any, or the water-right applications for other lands, subject to cancellation, with the forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

The charges may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the North Platte project, for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office; but in case this privilege is availed of, the necessary charges for the transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

This notice was transmitted with the plats to the Commissioner of the General Land Office, for transmission to the local land office at Alliance, Nebr., with instructions for conforming to the farm units



shown thereon the homestead entries made or to be made under the provisions of the reclamation act; the local officers to give publicity to the notice and announce, in addition to the matters covered therein, that water-right applications must be filed in the proper form in the local land office before water can be furnished; that the United States will operate and maintain the storage and diversion works and main canals, as shown on a plat of the project approved by the Director of the Reclamation Service, a copy of which is on file with the engineer in charge of the project, the same to be subject to amendment and extension from time to time as may be found necessary, and the cost of such operation and maintenance to be included in the maintenance charges for the project; that the necessary laterals and sublaterals constituting the balance of the distributing system will be maintained by the water users to be served therefrom, at their expense, under regulations approved by the Secretary of the Interior; that the amount of water to be furnished, to be stated in the second paragraph of every application, is  $2\frac{1}{2}$  acre-feet per acre per annum; that the amount of the charge and number of installments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence by private land owners in the neighborhood of their lands has been fixed at 50 miles; and that the Secretary of the Interior has entered into a contract with the North Platte Valley Water Users' Association, and the certificate of that association, forming a part of the water-right application, must be filled in before the application can be accepted; but when entry is hereafter made, and it is not practicable to have the certificate filled in before the water-right application is presented, the application to enter and the water-right application will be received and suspended without action, and the application will retain its priority for thirty days, within which time a certificate in accordance with the printed form must be presented, in default of which the application to enter and the water-right application will be rejected.

#### PUBLIC NOTICE DATED JUNE 2, 1909

The public notice issued March 3, 1909, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), opening to irrigation lands in the first lateral district of the North Platte project, Nebraska-Wyoming, contains the following provision:

All future water-right applications for lands in the first lateral district shall be subject to the new rate herein announced, and must be accompanied by the first installment of the charges, the amount being the same as for applications heretofore filed, \$2.40 per acre of irrigable land. The second installment, \$3 per acre, shall become due December 1, 1909. One of the subsequent installments, \$5 per acre for the building charge plus such sum as may be announced as the portion of the installment for operation and maintenance, shall be due on December 1 of each succeeding year for eight years. \* \* \*

The said provision is hereby amended to read as follows:

All future water-right applications for lands in the first lateral district entered prior to March 3, 1909, shall be subject to the new rate herein announced, and must be accompanied by 40 cents per acre of irrigable land to cover payment of the portion of the installment for operation and maintenance for 1908. The first installment of the building charge, due December 1, 1908, shall be reduced to \$2 per acre; the second installment, \$3 per acre, shall become due December 1, 1909. One of the remaining installments, \$5 per acre, for the building charge plus such sum as may be hereafter announced as the portion of the installment for operation and maintenance, shall become due on December 1 of each succeeding year for eight years. All entries of lands in the first lateral district made on or after March 3, 1909, must be accompanied by water-right application and the first installment of the charges for building, operation, and maintenance, \$2.40 per acre, of irrigable land. The second installment, \$3 per acre, shall become due December 1, 1909. One of the remaining installments, \$5 per acre, for the building charge plus such sum as may be hereafter announced as the portion of the installment for operation and maintenance, shall become due on December 1 of each succeeding year for eight years.

All the provisions of the public notice of March 3, 1909, shall remain in full force and effect except as modified herein.

## SETTLEMENT

At the end of the fiscal year 429 water-right applications had been received for an aggregate area of 34,623 acres of land. Most lands opened for irrigation in the first and second lateral districts are either in a state of transition of ownership or are being held by the less progressive settlers. It is believed that some settlers will be ready to sell their holdings or relinquish their entries this fall. At the present time the prices for which relinquishments are being sold range, for 80-acre tracts, from \$300 to \$2,500.

## OPERATION AND MAINTENANCE

To facilitate the operation of the Interstate canal unit the lands irrigated are separated into three divisions, each in charge of an assistant engineer. The first division includes 45 miles of the main canal, water for irrigation being delivered principally to lands in a Carey Act selection in Wyoming controlled by the North Platte Canal and Colonization Company, the lateral system of which is managed by the farmers themselves; the second division comprises about 30 miles of the main canal and the first lateral district; and the third division includes 20 miles of the main canal and the second lateral district.

The Carey Act selection under the first division, includes 20,000 acres of irrigable land, of which 7,600 acres are being irrigated in 1909.

The second division is divided into four lateral districts, each in charge of a practical irrigation superintendent, who looks after the distribution of water and the maintenance of canals and laterals and gives advice to inexperienced farmers in irrigation matters.

On the third division, in addition to instructions in irrigation practice given by three irrigation superintendents, an expert farmer has been employed to operate an 80-acre demonstration farm and give advice to beginners in irrigation farming.

The extent of irrigation operations in the season of 1909 is shown by the following table:

*Crops irrigated from Interstate canal in 1909*

Kind of crop.	Carey act lands in Wyoming.	First lateral district.	Second lateral district.	Total.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Oats.....	3,099	6,627	4,865	14,591
Wheat.....	1,058	2,725	2,606	6,389
Speltz.....	76	271	675	1,022
Barley.....	554	1,090	1,285	2,929
Rye.....	33	156	442	631
Millet.....	53	110		163
Potatoes.....	809	1,452	1,310	3,571
Alfalfa.....	849	1,524	1,115	3,488
Beets.....	18	679	215	912
Beans.....	12	99		111
Corn.....	508	2,992	2,352	5,852
Cane.....	85	175	145	405
Wheat grass.....	380		698	1,078
Macaroni wheat.....	25	1,623	436	2,064
Miscellaneous.....	68	142	826	1,036
Total.....	7,627	19,665	16,970	44,262

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, North Platte project*

## ASSETS

<b>Accounts receivable:</b>			
Uncollected freight refunds.....	\$6,134.60		
Uncollected water rentals.....	90,665.80		
Uncollected water-right building charges.....	66,418.20		
Uncollected water-right operation and maintenance charges.....	4,651.44		
			<b>\$167,870.04</b>
<b>Inventories:</b>			
Government animals.....	23,849.37		
Equipment in use.....	23,925.06		
Storehouse.....	11,737.71		
Cement.....	3,822.57		
Iron and steel.....	2,198.94		
Lumber.....	1,637.71		
Forage.....	3,732.58		
Fuel.....	430.81		
Cash in office safe.....	36.37		
Local products.....	2,476.52		
Unadjusted transfers.....	3,705.96		
Freight and handling.....	520.25		
			<b>77,033.35</b>
<b>Cost of work:</b>			
Building cost.....	3,750,817.26		
Less adjustments.....	\$3,550.78		
Less accrued revenues.....	30,711.74		
		<b>34,262.52</b>	
			<b>3,716,554.74</b>
<b>Operation and maintenance cost.....</b>		<b>363,122.40</b>	
Less accrued revenues.....		82,480.00	
			<b>280,642.40</b>
<b>Total assets.....</b>			<b>4,242,100.53</b>

## LIABILITIES

<b>Investment of the United States:</b>			
Disbursement vouchers.....	\$3,520,215.38		
Transfer vouchers received.....	549,987.07		
		<b>\$4,070,152.45</b>	
Collection vouchers.....	25,938.96		
Transfer vouchers issued.....	8,401.74		
		<b>34,340.70</b>	
			<b>\$4,035,811.75</b>
<b>Accounts payable:</b>			
Unpaid labor.....	18,005.41		
Unpaid purchases.....	5,125.30		
Unpaid contract estimates.....	21,496.66		
Unpaid contract holdbacks.....	50,914.14		
Unpaid freight and express.....	22,719.22		
Unpaid passenger fares.....	783.41		
			<b>119,044.14</b>
<b>Repayments accrued:</b>			
Building.....	72,062.20		
Operation and maintenance.....	15,182.44		
			<b>87,244.64</b>
<b>Total liabilities.....</b>			<b>4,242,100.53</b>

*Feature costs to June 30, 1909, North Platte project*

<b>Storage works:</b>			
Real estate (lands submerged).....	\$85,361.11		
Pathfinder dam.....	884,897.25		
Buildings: Gate keeper's house, emergency gate-house, and storehouse.....	18,070.22		
Pathfinder dike.....	1,583.59		
Pathfinder tunnel.....	46,619.45		
High-pressure gates.....	114,974.65		
Pile bridge.....	4,507.57		
			<b>\$1,156,013.84</b>
<b>Diversion works:</b>			
Whalen dam.....	230,462.48		
Guernsey dam.....	5,634.01		
			<b>236,096.49</b>

<sup>a</sup> This is a credit amount.

## Canal system:

Main canal, earthwork.....	\$1,323,791.68	
Main canal, structures.....	491,994.06	
Alcover Casper canal survey.....	1,222.09	
Goshen Hole survey.....	18,015.62	
		<u>\$1,835,023.45</u>

## Lateral system:

Earthwork.....	263,067.73	
Structures.....	179,771.59	
Bridges.....	26,559.45	
Land lines and subdivision.....	24,203.92	
		<u>493,602.69</u>
Real estate (rights and property): Lands purchased.....		<u>30,080.79</u>

Total building cost..... 3,750,817.26

## Operation and maintenance:

Pathfinder dam.....	1,349.76	
Main canal division.....	138,161.22	
Lateral district No. 1.....	172,013.07	
Lateral district No. 2.....	50,041.29	
Rawhide lateral district.....	1,557.06	
		<u>363,122.40</u>

Total building and maintenance and operation cost as per debit  
in cost of work in statement of assets and liabilities..... 4,113,939.66

## NEVADA

### TRUCKEE-CARSON PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: Nevada.

Counties: Churchill, Storey, and Lyon.

Townships: 17 and 18 N., Rs. 17 to 30 E.; 19 N., Rs. 26 to 31 E.; 20 N., Rs. 22 to 31 E., Mount Diablo meridian.

Railroad: Southern Pacific.

Railroad stations: Fernley, Hazen, and Fallon.

Average elevation of irrigable area: 4,000 feet above sea level.

Average annual rainfall on irrigable area: 4 inches.

Range of temperature on irrigable area: 0° F. to 105° F.

#### WATER SUPPLY

Source of water supply: Truckee and Carson rivers.

Area of drainage basin: 3,450 square miles.

Average elevation of drainage basin: 8,000 feet above sea level.

Average annual rainfall on drainage basin: 25 inches.

Average annual run-off of drainage basin: 1,000,000 acre-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoirs: Lake Tahoe—area, 125,000 acres; capacity, 750,000 acre-feet; length of spillway, 85 feet; elevation of spillway, 6 feet above stream bed. Alkali Flat—area, 8,500 acres; capacity, 228,000 acre-feet. Lower Carson—area, 11,000 acres; capacity, 290,000 acre-feet.

Storage dams: Lake Tahoe—type, concrete sluiceway regulator; maximum height, 14 feet; length of crest, 109 feet; contents, 425 cubic yards. Lower Carson, not designed.

Diversion dams: Truckee River—type, concrete sluiceways; maximum height, 22 feet 4 inches; length of masonry, 171 feet; length of earthfill, 1,160 feet. Carson River—type, concrete sluiceways; maximum height, 20 feet 9 inches; length of masonry, 240 feet. Others not designed.

Length of canals (first unit): 104 miles with capacities greater than 300 second-feet; 79 miles with capacities less than 300 and greater than 50 second-feet; 487 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 2,830 feet.

Aggregate length of dikes: 50,000 feet.

Water power: Plans not completed.

Construction of project authorized: March 14, 1903.

Per cent completed: Entire project, 61; first unit, 90.

#### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 206,000 acres; first unit, 90,723 acres.

Ownership of irrigable lands (first unit): Public 44,895 acres; railroad, 10,147 acres; private, 35,681 acres.

Lands irrigated season of 1909: Public, 28,000 acres; private, 4,000 acres.

Character of soil of irrigable area: Sand, sandy loam, adobe, and clay.

Duty of water: 3 acre-feet per acre per annum at the farm.

Principal products: Alfalfa, grain, potatoes, and onions.

Principal markets: Nevada mining camps; California cities.

## LANDS OPENED FOR IRRIGATION

Dates of public notices and orders relating thereto: May 6, 1907; November 1, 1907; January 30, 1908; April 4, 1908; June 5, 1908; December 26, 1908; March 1, 1909.

Location of lands opened: Tps. 18, 19, and 20 N., Rs. 24 to 30 E., Mount Diablo meridian.

Irrigable area opened: Public, 44,895 acres; private, 35,681 acres; railroad, 10,147 acres.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: \$22 and \$30.

Annual operation and maintenance charge: \$0.60 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Truckee-Carson project may be found in the fifth annual report, and general descriptions of the project and of the progress of work thereon are given in all of the other annual reports. Briefly, the irrigation plan of the project provides for a dam at the outlet of Lake Tahoe, converting the lake into a storage reservoir; a diversion dam on Truckee River about 20 miles below Reno, Nev.; a canal taking water from Truckee River at the south end of the diversion dam and supplying water to lands in the Carson and lower Truckee River valleys and to lower Carson reservoir on Carson River; a storage dam on Carson River creating lower Carson reservoir; a diversion dam on Carson River about 5 miles below the storage dam; two canals, one on each side of Carson River, heading at the diversion dam and watering lands in the lower Carson River valley; a diversion dam on Carson River near Dayton, Nev.; two canals, one on either side of the river, the one on the right watering lands in the Carson River valley and supplying water to Alkali Flat reservoir, a natural reservoir near Fort Churchill, Nev.; a diversion dam on Carson River at a point about 3 miles below the outlet of Alkali Flat reservoir; and two canals, one on either side of the river, watering lands in the Carson River valley below Churchill. The diversion dam on Truckee River, the diversion canal carrying water from this point over the divide into the Carson River valley, the diversion dam on Carson River below the site of the Carson storage dam, and canals and laterals for delivering water to about 91,000 acres of land are completed. Construction of the remaining features of the project has not been commenced, and no further extensions of canals are contemplated before storage reservoirs are built.

## CONSTRUCTION

The construction of the lateral system between Wadsworth and Hazen, Nev., by the Truckee-Carson Farmers' Association has been completed. A later contract was entered into with the same association for the excavation of lateral ditches in districts 3 and 5, and this work has also been completed. Altogether, ninety-one separate units of work were let in thirty-one contracts.

During the fiscal year force-account construction was carried on in building structures in ditches excavated by the Truckee-Carson Farmers' Association and in completing unfinished parts of the lateral system.

## HYDROGRAPHIC STUDIES

Extensive studies of the hydrography of the project have been carried on and completed in order to plan for future developments.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Truckee-Carson project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
2	Sept. 3, 1903	C. A. Warren & Co....	Main canal, division 1.	\$303,417.00	\$479,708.06	Feb. 2, 1905
16	Sept. 17, 1904	San Francisco Construction Co.	Distributing canals, structures.	43,220.00	66,242.49	May 3, 1905
71	Oct. 25, 1905	Pacific Portland Cement Co.	Cement.....	3,490.65	3,490.65	

<sup>a</sup> Completed.

## ORDER DATED DECEMBER 26, 1908

Under the instructions heretofore issued in connection with the Truckee-Carson project, Nevada, constructed under the provisions of the act of Congress approved June 17, 1902 (32 Stat. L., 388), the limit of distance to be regarded as residence in the neighborhood of the land to permit sales of water rights for lands in private ownership was fixed at 20 miles.

By virtue of the authority contained in section 10 of the reclamation act, the said limit of distance to be regarded as residence in the neighborhood of the land is hereby extended to 50 miles.

## PUBLIC NOTICE DATED MARCH 1, 1909

The public notice issued May 6, 1907, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), for the Truckee-Carson project, Nevada, provides that the charges per acre for lands which can be irrigated by the waters of said project are divided into two parts and that the part for operation and maintenance for the irrigation season of 1907 and until further notice shall be 40 cents per acre of irrigable land.

In pursuance of the terms of said notice and of the said act of Congress, it is hereby announced that the portion of the installment on account of operation and maintenance to become due December 1, 1909, shall be 60 cents per acre of irrigable land. Water-right applicants, who, by reason of prior payments, are entitled to credits on the portion of the installment for operation and maintenance becoming due December 1, 1909, shall be required to pay the difference between the amount to be credited and the amount herein specified as the portion of the installment for operation and maintenance.

In accordance with order issued January 30, 1908, payment of the portion of the installment for operation and maintenance due December 1 of each year must be made on or before April 1 of the following year, in default of which no water will be furnished for the irrigation of such lands.

## SETTLEMENT

On June 30, 1909, there were in effect 307 homestead entries containing 25,016.83 acres of irrigable land, 354 water-right applications for 31,355.1 acres of land, and contracts recognizing 12,934.2 acres of land with vested water right. The total area unsettled or not applied for amounted to 57,894 acres.

The new area settled during the fiscal year was small. Many inquiries from prospective settlers were received, but settlement has not been encouraged and will not be encouraged until the storage dam at Lake Tahoe is built and under the control of the United States.

#### OPERATION AND MAINTENANCE

The season of 1908 was very dry, as the snowfall for the previous winter had been light, and after July 1 the amount of water was insufficient for proper irrigation of the land under cultivation on the project. In October the ditches were emptied; on January 1, 1909, the work of cleaning and repairing was started; and on March 6 water was again turned into the ditches. The snowfall in the mountains during the winter was heavy. Very heavy storms occurred early in the winter and in February the prospects were good for a heavy run-off. Little snow fell after March 1, but the snow on the ground at that time was solid and melted slowly. An abundance of water has been available for all irrigation needs to the 1st of July. The operation of the irrigation system has been carried on without unusual incident. The cost of maintenance has been lower than usual and will probably be the lowest of any season since the opening of the project.

#### AGRICULTURAL DEVELOPMENT

Windy weather and the shortage of water in the late summer reduced crop yields in the season of 1908. The early part of the season of 1909 was cool and backward, but on the whole crops are in better condition than any year since the opening of the project. The status of agricultural development in November, 1908, and June, 1909, is indicated by the following table:

*Old and new lands planted and yield therefrom in 1908, and old and new lands planted in 1909, Truckee-Carson project*

Planted to—	Lands under cultivation November, 1908.			Lands under cultivation June 15, 1909.	
	Planted prior to 1908.	New land planted, 1908.	Total yield.	Planted prior to 1909.	New land planted, 1909.
	<i>Acres.</i>	<i>Acres.</i>	<i>Tons.</i>	<i>Acres.</i>	<i>Acres.</i>
Pasture.....	10,348			10,000	
Wild hay (grass).....	485		1,650	3,000	
Grain hay.....	102	769	542		
Alfalfa.....	5,789	982	12,663	7,472	1,874
Grain.....	2,244	511	1,505	3,047	2,980
Corn (Kaffir corn, sorghum, cane, etc.).....	8	48	40		
Potatoes.....	160	270	1,118	248	284
Garden.....	59	108	34	135	97
Orchard.....	147	103		76	58
Onions.....				9	30
All other crops.....	33		19	2,155	94
Land prepared and not seeded.....				715	815
<b>Total.....</b>	<b>19,375</b>	<b>2,791</b>	<b>17,571</b>	<b>26,857</b>	<b>6,232</b>



## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Truckee-Carson project*

## ASSETS

Accounts receivable:			
Uncollected freight refunds.....		\$190.75	
Uncollected miscellaneous.....		550.09	
Uncollected water-right building charges.....		53,772.63	
Uncollected water-right operation and maintenance charges.....		5,565.69	
			\$60,079.16
Inventories:			
Government animals.....		5,207.11	
Equipment in use.....		17,080.05	
Storehouse.....		29,966.42	
Unadjusted transfers.....		785.02	
Freight and handling undistributed.....		11,575.44	
			64,614.04
Cost of work:			
Building cost.....		3,708,886.75	
Less adjustments.....	\$50.82		
Less accrued revenues.....	2,547.91		
		2,598.73	
			3,706,288.02
Operation and maintenance cost.....		248,877.47	
Less accrued revenues.....		534.00	
			248,343.47
Total assets.....			4,079,324.69

## LIABILITIES

Investment of the United States:			
Disbursement vouchers.....	\$3,871,817.21		
Transfer vouchers received.....	155,056.14		
		\$4,026,873.35	
Collection vouchers.....	56,462.39		
Transfer vouchers issued.....	24,445.95		
		80,908.34	
			\$3,945,965.01
Accounts payable:			
Unpaid labor.....		142.98	
Unpaid purchases.....		779.18	
Unpaid contract estimates.....		16,940.85	
Unpaid freight and express.....		9,251.92	
Unpaid passenger fares.....		167.85	
			27,282.78
Repayments accrued:			
Building.....		81,923.83	
Operation and maintenance.....		24,153.07	
			106,076.90
Total liabilities.....			4,079,324.69

*Feature costs to June 30, 1909, Truckee-Carson project*

Buildings:			
Headquarters and permanent buildings.....	\$34,657.20		
Ditch tender's houses.....	6,189.95		
			\$40,847.15
Distributing system:			
Main canals.....	407,751.13		
Lateral and drainage system.....	1,198,771.13		
Carson River channel (straightening old river).....	124,952.17		
Lower Carson diversion dam.....	82,222.92		
Power house drop, V-line.....	61,843.29		
			1,875,540.64
Examination of project as a whole:			
Examination, general.....	36,826.58		
Examination, reservoir sites and storage.....	43,177.46		
Hydrography.....	4,479.31		
Topographic surveys.....	55,002.36		
			139,485.71
Experiment farms: Buildings.....		5,647.90	
Lake Tahoe reservoir and regulating works, preliminary examination..		2,783.96	
Main Truckee canal: Earthwork and structures, including Derby bridge.....			1,534,696.60
Pyramid Lake canal: Location surveys.....		2,258.86	
Real estate (rights and property): Land purchased.....			53,452.29

<b>Irrigable lands:</b>		
Farm-unit subdivision.....	\$597. 04	
Location survey, miscellaneous.....	1, 402. 98	
Section lines (Carson Sink valley).....	10, 342. 51	
		<b>\$12, 342. 53</b>
Telephone system: Construction.....		36, 968. 76
Carson Sink drain: Preliminary expense.....		3, 672. 50
Administration of project as a whole: General expense.....		665. 28
Inventory of unused supplies.....		524. 57
		<b>3, 708, 886. 75</b>
<b>Total building cost.....</b>		
<b>Operation and maintenance:</b>		
Operation (all features).....	67, 887. 26	
Flood expense (extraordinary).....	73, 550. 02	
Maintenance, including repairs, betterments, inspection, etc., on all features.....	107, 440. 19	
		<b>248, 877. 47</b>
<b>Total building and operation and maintenance cost as per debit in cost of work in statement of assets and liabilities ..</b>		<b>3, 957, 764. 22</b>

### WALKER RIVER PROJECT

A detailed description of the Walker River project is given in the fifth annual report. During the fiscal year investigations have been resumed on this project as the first work to be undertaken in connection with a general reconnaissance of principal irrigation possibilities throughout the State of Nevada. The total expenditures on the Walker River project to June 30, 1909, amount to \$12,346.12.

## **NEW MEXICO**

### **CARLSBAD PROJECT**

#### **LOCATION AND CLIMATIC CONDITIONS**

Territory: New Mexico.  
County: Eddy.  
Townships: 21 S., Rs. 26 and 27 E.; 22 S., Rs. 26, 27, and 28 E.; 23 S., Rs. 27 and 28 E.; 24 S., R. 28 E., New Mexico meridian.  
Railroad: Eastern Railway of New Mexico (Santa Fe System).  
Railroad stations: Carlsbad, Otis, Loving, and Malaga, N. Mex.  
Average elevation of irrigable area: 3,100 feet above sea level.  
Average annual rainfall on irrigable area: 15 inches.  
Range of temperature on irrigable area: 0° F. to 110° F.

#### **WATER SUPPLY**

Source of water supply: Pecos River.  
Area of drainage basin: 22,000 square miles.  
Average elevation of drainage basin: 4,500 feet above sea level.  
Average annual rainfall on drainage basin: 16 inches.  
Average annual run-off of drainage basin: 150,000 acre-feet.

#### **ENGINEERING DATA FOR COMPLETE PROJECT**

Reservoirs: Avalon—area, 1,600 acres; capacity, 6,000 acre-feet; length of spillways, 1,000 feet; elevation of spillways, 21 feet above stream bed. McMillan—area, 6,300 acres; capacity, 29,000 acre-feet; No. 1 spillway, 200 feet in length and 23.3 feet above stream bed; No. 2 spillway, 600 feet in length and 25 feet above stream bed.

Storage dams: McMillan—type, earth and rock fill; maximum height, 52 feet; length of crest, 1,686 feet. Avalon—type, earth and rock fill with concrete core wall; maximum height, 50 feet; length of crest, 1,300 feet; contents, 168,300 cubic yards.

Length of canals: 5 miles with capacities greater than 300 second-feet; 25 miles with capacities less than 300 and greater than 50 second-feet; 120 miles with capacities less than 50 second-feet.

Aggregate length of dikes: 4,000 feet at Lake McMillan.

Construction of project authorized: February 1, 1906.

Per cent completed: 99.8.

#### **AGRICULTURAL CONDITIONS**

Irrigable area (whole project): 20,073 acres.

Ownership of irrigable lands: Practically all private.

Lands irrigated, season of 1909: 12,000 acres.

Character of soil of irrigable area: Fertile alluvium.

Duty of water: 3 acre-feet per acre per annum at the farm.

Principal products: Alfalfa, apples, corn, cotton, grapes, melons, peaches, and vegetables.

Principal markets: Carlsbad, N. Mex.; Denver, Colo.; Chicago, Ill.; Kansas City, Mo.; and Fort Worth, Tex.

#### **LANDS OPENED FOR IRRIGATION**

Dates of public notices: December 17, 1907; November 30, 1908; June 2, 1909.

Location of lands opened: Tps. 21, 22, 23, 24 S., Rs. 26, 27, 28 E., New Mexico meridian.

Irrigable acreage opened: Public, 10 acres; private, 20,063 acres.

Limit of area of farm units: 160 acres.

Building charge per acre of irrigable land: \$31.

Annual operation and maintenance charge: \$1.35 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Carlsbad project may be found in the fourth annual report, and general descriptions of the project and of the progress of work thereon are given in the later annual reports. Briefly, the irrigation plan of this project provides for a storage reservoir at Lake McMillan on Pecos River near McMillan, N. Mex., a storage and distributing reservoir on the same river near Lakewood, N. Mex., controlled by Avalon dam, and the utilization of an existing related canal system. The diversion canal takes water from the east side of Pecos River at Avalon dam and divides about 18 miles below the headworks, one branch watering lands on the east side and the other branch watering lands on the west side of Pecos River in the vicinity of Carlsbad. Construction work on the project is practically completed.

## CONSTRUCTION

The only construction work on the Carlsbad project during the fiscal year comprised the installation of the main outlet gates at Lake McMillan; the building of a dike 4,000 feet long around leaky portions of McMillan reservoir, and the construction of a number of small concrete diversion headworks in the canals. The work, except some of the diversion headworks, has been completed. The dikes constructed on the east side of the reservoir proved to be successful beyond expectations. It is now possible to fill Lake McMillan to the 23.5-foot level, which will bring the capacity of the reservoir to about 30,000 acre-feet.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Carlsbad project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
223	Mar. 16, 1908	United Kansas Portland Cement Co.	Cement.....	.....	\$289.58	Oct. 1, 1908
273	Feb. 25, 1909	Iola Portland Cement Co.	.....do.....	.....	84.80	Dec. 1, 1908

## PUBLIC NOTICE DATED NOVEMBER 30, 1908

On December 17, 1907, public notice was issued in pursuance of the act of Congress approved June 17, 1902 (32 Stat. L., 388), in connection with the Carlsbad project, New Mexico, announcing that water would be furnished in the irrigation season of 1908 for the irrigable lands shown upon the farm-unit plats of Tps. 21 and 22 S., R. 26 E.; Tps. 21, 22, and 23 S., R. 27 E.; Tps. 23 and 24 S., R. 28 E.; and T. 23 S., R. 29 E.

The said notice further announces that for lands entered after March 1, 1908, the first installment of the water-right charges must be paid at the time of entry, and the second installment shall be due and payable March 1, 1909, and for subsequent years on or before March 1 of each year, and that for lands in private ownership and for lands entered prior to March 1, 1908, the first installment shall be due and payable March 1, 1908, and subsequent installments on March 1 of each year thereafter.

In view of the adverse conditions existing on this project and the inability of many settlers to make a crop in the irrigation season of 1908, it has been decided to amend the said notice so as to enable the landholders to secure the benefit of next year's crop before the second installment of the water-right charges shall become due and payable, and the provisions thereof are hereby amended as follows:

For lands entered after March 1, 1908, the second installment of the water-right charge shall be due and payable December 1, 1909, and subsequent installments on or before December 1 of each year, and for lands in private ownership and lands entered prior to March 1, 1908, the first installment of the water-right charge shall be due and payable December 1, 1908, and subsequent installments on or before December 1 of each year thereafter.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1909 for any lands unless the portion of the installment for operation and maintenance due and payable on or before December 1, 1908, has been paid on or before April 1, 1909, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before April 1 of that year of the portion of the installment for operation and maintenance which was at that time due and payable.

The public notice of December 17, 1907, also announces that the charges for the building of the irrigation system are payable in not less than five nor more than ten annual installments. This provision is hereby modified so that the said charges shall be payable in not more than ten annual installments: *Provided, however,* That full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

The charges herein provided for may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the Carlsbad project for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office; but in case this privilege is availed of the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

All the provisions of the public notice of December 17, 1907, shall remain in full force and effect except as modified herein.

This notice was referred to the Commissioner of the General Land Office with instructions that appropriate action be taken for putting the provisions thereof into effect and that the local land office publish the notice in the local newspapers.

#### PUBLIC NOTICE DATED JUNE 2, 1909

The public notice issued December 17, 1907, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), for the Carlsbad project, New Mexico, provides that the charges per acre for lands which can be irrigated by the waters of said project are divided into two parts and that the part for operation and maintenance for the irrigation season of 1908 and until further notice shall be 75 cents per acre of irrigable land whether water is used thereon or not.

In pursuance of the terms of said notice and of the said act of Congress it is hereby announced that the portion of the installment on account of operation and maintenance to become due December 1, 1909, shall be \$1.35 per acre of irrigable land, and the said rate shall remain in effect for subsequent years until further notice, the charges becoming due on December 1 of each year.

In accordance with the terms of the public notice of November 30, 1908, payment of the portion of the installment for operation and maintenance due December 1 of each year must be made on or before April 1 of the following year, and no water will be furnished to any lands until payment of said portion of the installment is made.

#### SETTLEMENT

Many new settlers arrived on the project during the winter and early spring months and bought tracts varying in size from 1 to 160 acres. Most of these men set actively to work and spent considerable time and money in making improvements and planting crops.

## OPERATION AND MAINTENANCE

The principal maintenance work included the regular winter cleaning of the canals and laterals, minor repairs and changes to the spill gates at Avalon reservoir, and cleaning the main canal of moss. The moss is removed by dragging the canal with a heavy anchor chain once in about twelve days during the late spring and summer months.

Operation is becoming simpler as the farms are better cared for and as the farmers make progress in the art of irrigation. Thus far it has been found more economical and satisfactory generally to adhere closely to a card application system of water delivery, irrigators being required to file a written application for water three days in advance of the expected date of delivery.

## AGRICULTURAL DEVELOPMENT

Water-right applications for about 14,000 acres of irrigable land have been received. Of this area about 12,000 acres are planted in alfalfa, fruit trees, the various sorghum crops, Indian corn, cotton, and cowpeas. A considerable acreage was planted to alfalfa this spring by new settlers. On the whole the practice of spring planting of alfalfa has proved unsatisfactory on account of the foul condition of the land and hard, drying winds. The yield of alfalfa on old fields that received good care has been satisfactory. Prices for forage of all sorts are very high. The grain yield on a fairly large acreage this spring was extremely light on account of the green bug. The total number of farms irrigated this season is 195.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Carlsbad project*

ASSETS	
Accounts receivable:	
Uncollected miscellaneous.....	\$95.00
Inventories:	
Government animals.....	\$530.00
Equipment in use.....	5,510.39
Storehouse.....	2,704.79
Forage.....	148.57
Unadjusted transfers.....	22.61
	<hr/>
	8,916.36
Cost of work:	
Building cost.....	593,292.95
Operation and maintenance cost.....	65,068.68
Less accrued revenues.....	807.56
	<hr/>
	64,171.12
Total assets.....	<hr/>
	666,475.43
LIABILITIES	
Investment of the United States:	
Disbursement vouchers.....	\$673,378.36
Transfer vouchers received.....	14,370.09
	<hr/>
	\$687,748.45
Collection vouchers.....	20,410.37
Transfer vouchers issued.....	10,381.56
	<hr/>
	30,791.93
	<hr/>
	\$656,956.52
Accounts payable:	
Unpaid labor.....	1,616.66
Unpaid purchases.....	176.76
Unpaid freight and express.....	60.61
Unpaid passenger fares.....	38.13
	<hr/>
	1,892.16
Repayments accrued:	
Operation and maintenance.....	7,626.75
Total liabilities.....	<hr/>
	666,475.43

*Feature costs to June 30, 1909, Carlsbad project*

Storage works:	
Avalon storage and diversion dam.....	\$213,463.82
McMillan storage dam.....	4,589.78
	<hr/> \$218,053.60
Canal distributing system:	
Main and east side canals.....	165,739.90
Black River canal.....	12,298.95
	<hr/> 178,038.85
Lateral distributing system: Earthwork and structures.....	11,996.00
Real estate: Lands and right of way.....	151,904.96
Experimental farm: Operation expenses.....	1,014.18
Examination of project as a whole:	
Engineering.....	16,162.86
Examination.....	8,857.59
Surveys.....	9,445.79
Drilling.....	3,801.76
Designs.....	1,202.33
Stream gaging.....	1,928.27
Classification and subdivision.....	391.47
	<hr/> 41,790.07
Revenues and mess-house profits.....	(Cr.) 9,504.71
	<hr/> 593,292.95
Total building cost.....	
Operation and maintenance:	
Operation as a whole.....	17,753.18
Maintenance Avalon dam.....	1,455.84
Maintenance McMillan reservoir.....	27,542.92
Maintenance canal system.....	4,857.24
Maintenance laterals and ditches.....	12,613.23
Maintenance evaporation stations.....	302.98
Maintenance buildings.....	348.91
Maintenance motor cycles.....	194.38
	<hr/> 65,068.68
Total building and operation and maintenance cost as per debit in cost of work in statement of assets and liabilities.....	
	<hr/> 658,361.63

**HONDO PROJECT****LOCATION AND CLIMATIC CONDITIONS**

Territory: New Mexico.

County: Chaves.

Townships: 11 and 12 S., Rs. 22, 23, and 24 E., New Mexico meridian.

Railroad: Eastern Railway of New Mexico (Santa Fe system).

Railroad station: Roswell, N. Mex.

Average elevation of irrigable area: 3,750 feet above sea level.

Average annual rainfall on irrigable area: 16 inches.

Range of temperature on irrigable area: 0° F. to 100° F.

**WATER SUPPLY**

Source of water supply: Hondo River.

Area of drainage basin: 1,037 square miles.

Average elevation of drainage basin: 8,000 feet above sea level.

Average annual rainfall on drainage basin: 17 inches.

**ENGINEERING DATA FOR COMPLETE PROJECT**

Reservoir: Hondo—area, 1,910 acres; capacity, 40,000 acre-feet.

Storage dams: Six earth embankments; maximum height, 22 feet; aggregate length, 16,504 feet.

Diversion dam: Type, earth fill; maximum height, 20 feet; length, 100 feet.

Length of canals: 3 miles with capacities greater than 300 second-feet; 2 miles with capacities less than 300 and greater than 50 second-feet; 11 miles with capacities less than 50 second-feet.

Construction of project authorized: September 6, 1904.

Project completed: May, 1907.

#### AGRICULTURAL CONDITIONS

Irrigable area (whole project): 10,000 acres.

Ownership of irrigable lands (whole project): Public, 240 acres; private, 9,760 acres.

Lands irrigated season 1909: None, because of lack of water.

Character of soil of irrigable area: Rich alluvium.

Principal products: Alfalfa and fruits.

Principal markets: Roswell, N. Mex.; Kansas City, Mo.; Chicago, Ill.; and Texas cities.

#### GENERAL STATEMENT

A detailed description of the Hondo project may be found in the third annual report, and general descriptions of the project and the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for a diversion dam on Hondo River about 10 miles southwest of Roswell, N. Mex., diverting water through a short inlet canal into a natural storage reservoir, the capacity of which is increased by embankments; the return of stored water to the river and the diversion of water 2 miles below the reservoir on the south side of the river and 4 miles below the reservoir on the north side into existing canal systems. The construction work on the project has been completed.

#### PRESENT CONDITIONS

During the fiscal year a small check gate and turnout was built and some investigations were made to determine the loss of water from the river channel above the reservoir.

Temporary water-rental contracts were entered into with individuals during 1908 and about 1,200 acres were served with an inadequate supply of water. No water has been available in 1909.

Some alfalfa, head corns, and fruit trees are under cultivation and are being maintained with great trouble.

The whole irrigable area, 10,000 acres, would be in cultivation in a very short time were a sufficient supply of water assured.

#### FINANCIAL STATUS

##### *Assets and liabilities on June 30, 1909, Hondo project*

ASSETS			
Inventories:			
Government animals.....			\$60.00
Cost of work:			
Building cost.....	\$344,319.71		
Less accrued revenues.....	2,576.08		
			<u>341,743.63</u>
Total assets.....			341,803.63
LIABILITIES			
Investment of the United States:			
Disbursement vouchers.....	\$359,114.60		
Transfer vouchers received.....	10,775.47		
		\$369,890.07	
Collection vouchers.....	27,864.54		
Transfer vouchers issued.....	541.18		
		<u>28,405.72</u>	
Accounts payable:			\$341,484.35
Unpaid labor.....		270.48	
Unpaid purchases.....		32.25	
Unpaid freight and express.....		16.55	
			<u>319.28</u>
Total liabilities.....			341,803.63



*Feature costs to June 30, 1909, Hondo project*

<b>Storage works:</b>		
Reservoir and embankment.....	\$96,192.49	
Outlet canal, excavation and embankment.....	57,772.59	
Protection embankment and outlet canal ditch.....	825.48	
		<b>\$154,790.56</b>
<b>Diversion system:</b>		
Inlet canal, headworks and earthwork.....	58,362.38	
Diversion dam, rock excavation.....	35,536.31	
		<b>93,898.69</b>
Distributing system: Laterals.....		<b>39,004.24</b>
Real estate (rights and property): Lands purchased.....		<b>21,599.46</b>
Irrigable lands: Farm-unit subdivision and soil examination.....		<b>19,837.41</b>
<b>Buildings:</b>		
Construction.....	1,738.99	
Maintenance.....	288.47	
		<b>2,027.46</b>
<b>Telephone line:</b>		
Construction.....	4,170.42	
Maintenance.....	57.25	
		<b>4,227.67</b>
Total building cost.....		<b>335,385.49</b>
<b>Operation and maintenance during construction:</b>		
Operation.....	7,125.62	
Maintenance inlet canal.....	83.90	
Maintenance outlet canal.....	14.25	
Maintenance reservoir.....	337.27	
Maintenance distributing system.....	1,109.43	
Maintenance motor cycles.....	263.75	
		<b>8,934.22</b>
Total building and operation and maintenance cost during construction, as per debit in cost of work in statement of assets and liabilities.....		<b>344,319.71</b>

**LEASBURG PROJECT****LOCATION AND CLIMATIC CONDITIONS**

Territory: New Mexico.  
 County: Dona Ana.  
 Townships: 22 to 24 S., Rs. 1 and 2 E., New Mexico meridian.  
 Railroad: Atchison, Topeka and Santa Fe.  
 Railroad stations: Selden, Leasburg, Mesquite, Vado, Berino, La Luna, Las Cruces, Dona Ana, and Mesilla Park, N. Mex.  
 Average elevation of irrigable area: 3,800 feet above sea level.  
 Average annual rainfall on irrigable area: 9½ inches.  
 Range of temperature on irrigable area: 0° F. to 110° F.

**WATER SUPPLY**

Source of water supply: Rio Grande. (See Rio Grande project.)

**ENGINEERING DATA FOR COMPLETE PROJECT**

Diversion dam: Type, rubble concrete weir; maximum height, 9 feet; length of masonry, 600 feet; length of earthfill, 1,600 feet.  
 Length of Leasburg canal: 6 miles with capacities greater than 300 second-feet.  
 Construction of project authorized: December 2, 1905.  
 Project completed: July, 1908.

**AGRICULTURAL CONDITIONS**

Irrigable area (whole project): 20,000 acres.  
 Ownership of irrigable lands: All private.  
 Lands irrigated season of 1909: 17,000 acres.  
 Character of soil of irrigable area: Fertile alluvium.  
 Principal products: Alfalfa, corn, wheat, melons, fruits, vegetables.  
 Principal markets: Towns in Texas and New Mexico; eastern cities.

## GENERAL STATEMENT

A detailed description of the Leasburg project may be found in the fifth annual report and general descriptions of the work planned and in progress thereon are given in other annual reports. Briefly, the irrigation plan of the project provides for a diversion dam at Penasco Rock, about 17 miles north of Las Cruces, N. Mex., diverting water from the east side of the Rio Grande into Leasburg canal, 6 miles long, leading to the existing canal systems in Mesilla Valley. The construction of the project has been completed so far as the present water supply will warrant.

## SURVEYS AND CONSTRUCTION

No new construction work was done on the project during the fiscal year, but farm-unit surveys have been in progress. This has been very difficult work, as the land is situated in old Spanish grants and has been subdivided into irregular tracts not well defined. It has been necessary to have the owners establish their corners by mutual agreement and mark them with concrete posts, furnished by the Reclamation Service. Then a rectangular system of surveys was made over the entire district and the individual lands located with a plane-table survey. Many apparent conflicts have been eliminated but some still exist and considerable trouble will undoubtedly be encountered in establishing some of the boundaries.

## OPERATION AND MAINTENANCE

On account of the difficulty in establishing farm-unit boundaries it has not been feasible to open this project for irrigation, and operation has been carried on under temporary water-rental contracts. Service through Leasburg canal has been continuous throughout the irrigation season when there was water in the river.

Some repairs have been necessary but, for a new canal built through a treacherous soil, the maintenance has been remarkably easy and cheap.

## AGRICULTURAL DEVELOPMENT

With assurance of water when there was a supply in the river, land has been better tilled and uniformly larger crops have been raised.

Cantalopes proved successful during 1908, in some cases netting more than \$300 per acre. In 1909 about 1,600 acres have been planted to cantelopes and prospects are good for an excellent crop.

Associations for disposing of products have been formed and business-like activity has been exhibited in the conduct of affairs.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Leasburg project*

ASSETS		
<b>Inventories:</b>		
Government animals.....	\$275.00	
Equipment in use.....	1,142.00	
Storehouse.....	324.42	
Cement.....	109.84	
Unadjusted transfers.....	118.74	
		<hr/>
		\$1,970.00
<b>Cost of work:</b>		
Building cost.....	201,795.35	
Less accrued revenues.....	9,224.74	
		<hr/>
		192,570.61
<b>Total assets.....</b>		<hr/>
		194,540.61

## LIABILITIES

## Investment of the United States:

Disbursement vouchers.....	\$205,706.86	
Transfer vouchers received.....	9,456.34	\$215,163.20
Collection vouchers.....	17,622.17	
Transfer vouchers issued.....	5,416.68	23,038.80
		<u>\$192,124.40</u>
Accounts payable:		
Unpaid labor.....	1,218.49	
Unpaid purchases.....	88.06	
Unpaid freight and express.....	1,036.18	
Unpaid passenger fares.....	53.20	
Unpaid miscellaneous.....	20.30	2,416.21
		<u>2,416.21</u>
Total liabilities.....		<u>194,540.61</u>

*Feature costs to June 30, 1909, Leasburg project*

Preliminary examination: Surveys.....		\$5,776.78
Diversion dam:		
Concrete weir and abutments.....	\$73,174.20	
Sluice gates and headgates.....	8,008.59	
Embankment at west end.....	4,463.98	85,646.77
		<u>85,646.77</u>
Main canal:		
Excavation, stations 0-60.....	30,809.70	
Excavation and structures, stations 60-309.....	43,536.03	
Sand sluiceway.....	6,702.00	
Change of river channel.....	11,895.38	92,943.11
		<u>92,943.11</u>
Buildings:		
Concrete house.....	3,027.68	
Miscellaneous.....	1,336.71	
Tents.....	226.39	4,590.78
		<u>4,590.78</u>
Telephone system: Construction.....		414.56
Real estate (rights and property): Lands purchased.....		1,556.67
Irrigable lands: Farm-unit subdivision and soil examination.....		7,053.01
Roads and bridges:		
Construction of bridges.....	398.08	
Construction of roads.....	109.87	507.95
		<u>507.95</u>
Operation and maintenance (during construction):		
Operation.....	2,502.22	
Maintenance, main canal and sluiceway.....	341.97	
Maintenance, canal structures.....	278.83	
Maintenance, dam and structures.....	64.00	
Maintenance, watchman's house.....	118.70	3,305.72
		<u>3,305.72</u>
Total building and operation and maintenance cost during construction, as per debit in cost of work in statement of assets and liabilities.....		<u>201,795.35</u>

## URTON LAKE PROJECT

A brief general description of the Urton Lake project is given in the second annual report. The work done on the project during the fiscal year has consisted mainly in the gaging of streams, and the total expenditures to June 30, 1909, amount to \$18,067.35.

## **NEW MEXICO-TEXAS**

### **RIO GRANDE PROJECT**

#### **LOCATION AND CLIMATIC CONDITIONS**

Counties: Sierra, Socorro, Dona Ana, N. Mex.; El Paso, Tex.

Railroads: Atchison, Topeka and Santa Fe; El Paso and Southwestern; Southern Pacific; Texas and Pacific.

Railroad stations: Engle, Rincon, and Las Cruces, N. Mex.; El Paso and Ysleta, Tex.

Average elevation of irrigable area: 3,700 feet above sea level.

Average annual rainfall on irrigable area: 9½ inches.

Range of temperature on irrigable area: 0° F. to 100° F.

#### **WATER SUPPLY**

Source of water supply: Rio Grande.

Area of drainage basin: 37,000 square miles.

Average elevation of drainage basin: 8,000 feet above sea level.

Average annual rainfall on drainage basin: 15 inches.

Average annual run-off of drainage basin: 800,000 acre-feet.

#### **ENGINEERING DATA FOR COMPLETE PROJECT**

Reservoir: Engle—Area, 40,000 acres; capacity, 2,538,000 acre-feet; length of spillway, not determined; elevation of spillway, 190 feet above stream bed.

Storage dam: Engle—Type, rubble concrete gravity; maximum height, 265 feet; length of crest, 1,400 feet; contents, 410,000 cubic yards.

Diversion dams: Four, not designed.

#### **AGRICULTURAL CONDITIONS**

Irrigable area (whole project, including 20,000 acres in the Leasburg project and 25,000 acres in Mexico): 180,000 acres.

Ownership of irrigable lands (whole project): All private.

Character of soil of irrigable area: Sandy loam and fertile alluvium.

Principal products: Alfalfa, corn, wheat, melons, fruits, vegetables.

Principal markets: Towns in Texas, New Mexico, and Louisiana; eastern cities.

#### **GENERAL STATEMENT**

A detailed description of the Rio Grande project may be found in the third annual report, and general descriptions of the plans and progress of work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for the storage of flood waters of the Rio Grande in a reservoir controlled by Engle dam, about 12 miles west of Engle, N. Mex.; diversions of water from the Rio Grande for the irrigation of lands in Las Palomas Valley, about 6 miles below the storage dam, in Rincon Valley, about 24 miles below the storage dam, and in El Paso Valley, about 120 miles below the storage dam; the furnishing of stored water to the Leasburg project to assist in the irrigation of 20,000 acres of land in Mesilla Valley; and the furnishing of 60,000 acre-feet of water per annum for use on 25,000 acres of land in El Paso Valley on the Mexican side of the Rio Grande. The irrigation works required for the Las Palomas and Rincon valleys will be new, and those required for El Paso Valley will supplement and improve existing canal systems. All large features of the project remain to be constructed.

## PROGRESS OF WORK

During the fiscal year a complete topographic survey has been made of the storage reservoir site. A large amount of development work has been done in the vicinity of the proposed dam site for the purpose of determining the exact location for the dam and the kind of material that will be encountered. A reenforced concrete water tank, with a capacity of 300,000 gallons, has been erected to supply water for development work and for use during construction. A railroad line has been surveyed from the proposed dam site to a point on the Rio Grande division of the Santa Fe system  $3\frac{1}{2}$  miles south of Engle, N. Mex. The length of this line is  $10\frac{1}{2}$  miles, and the first 3 miles from the dam site is through rocky canyons and necessitates sharp curves and heavy grades. A portion of the road has been constructed, but work was stopped in May on account of the failure to secure right-of-way at reasonable prices.

Topographic surveys have been in progress in El Paso Valley since December, 1908, in order to determine the feasibility of utilizing the existing Franklin canal and to secure other information desired in connection with planning an irrigation system.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Rio Grande project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
223	Mar. 16, 1908	United Kansas Portland Cement Co.	Cement.....		\$231.66	Oct. 1, 1908
258	Oct. 1, 1908	Iola Portland Cement Co.	.....do.....		186.24	June 1, 1909

## FINANCIAL STATUS

In order that the assets and liabilities for operations under the Rio Grande dam appropriation (34 Stat. L., 1357) to June 30, 1909, may be shown independently of the expenditures under the reclamation fund, the balance sheet has been prepared in two parts. The table showing feature costs gives the combined cost under both appropriations.

*Assets and liabilities on June 30, 1909, Rio Grande project*

## [Reclamation fund]

## ASSETS

Inventories: Cash in office safe .....	\$17.75
Cost of work: Building cost .....	62,338.47
Total assets .....	62,356.22

## LIABILITIES

Investment of the United States:	
Disbursement vouchers .....	\$53,833.56
Transfer vouchers received .....	19,560.38
	\$73,393.94
Collection vouchers .....	10,440.25
Transfer vouchers issued .....	597.47
	11,037.72
Total liabilities .....	\$62,356.22

## [Rio Grande dam appropriation]

## ASSETS

Cash (as per Table 19, page 32):		
With Treasurer United States .....	\$829,431.46	
In depository to credit of special fiscal agents.....	24,642.08	\$854,073.54
Inventories:		
Government animals.....	1,115.00	
Equipment in use.....	14,997.04	
Storehouse.....	14,526.67	
Cement.....	176.43	
Lumber.....	3,760.11	
Forage.....	1,256.37	
Unadjusted transfers.....	a 76.86	
Freight and handling undistributed.....	2,002.06	37,756.82
Cost of work:		
Building cost.....	117,213.61	
Less adjustments.....	\$3,003.18	
Less accrued revenues.....	80.50	
	3,083.68	114,129.93
Total assets.....		1,005,960.29

## LIABILITIES

Capital (as per Table 19, page 32): Special appropriation for Rio Grande dam (nonreimbursable).....		\$1,000,000.00
Accounts payable:		
Unpaid labor.....	\$1,536.44	
Unpaid freight and express.....	4,102.70	
Unpaid passenger fares.....	311.60	
Unredeemed coupon books.....	9.55	5,960.29
Total liabilities.....		1,005,960.29

*Feature costs to June 30, 1909, Rio Grande project*

Examination of project as a whole: Preliminary surveys.....	\$76,206.01	
Real estate (rights and property): Lands purchased.....	11,294.33	
Buildings:		
Camp construction.....	\$14,434.87	
Office buildings.....	64.33	
Plant buildings.....	3,369.75	17,868.95
Highways:		
McCrae canyon road.....	483.42	
Engle road.....	7,330.03	
Townsite road.....	6,530.23	
Camp roads.....	5,244.35	
Rio Grande dam road.....	397.11	19,985.14
Railroad construction:		
Surveys.....	3,328.11	
Grading.....	32,032.04	35,360.15
Waterworks:		
Concrete tank.....	5,667.31	
Pipe line.....	10,112.47	
Pumping plant.....	174.33	15,954.11
Administration of project as a whole: General expense.....		27.50
Plant accounts:		
Sand and gravel pits.....	909.76	
Crushing and screening plant.....	1,905.38	
Blacksmith shop.....	40.75	2,855.89
Total building cost as per debit in cost of work in statement of assets and liabilities.....		179,552.08

a This is a credit amount.

## NORTH DAKOTA

### BUFORD-TRENTON PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: North Dakota.  
County: Williams.  
Townships: 152 and 153 N., Rs. 102 to 104 W., fifth principal meridian.  
Railroad: Great Northern.  
Railroad stations: Buford and Trenton, N. Dak.  
Average elevation of irrigable area: 1,900 feet above sea level.  
Average annual rainfall on irrigable area: 15 inches.  
Range of temperature on irrigable area:  $-59^{\circ}$  F. to  $107^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Missouri River.  
Area of drainage basin: 155,000 square miles.  
Minimum recorded run-off of drainage basin: 4,000 second-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Length of canals: No canals with capacities greater than 300 second-feet; 1 mile with capacity less than 300 and greater than 50 second-feet; 24 miles with capacities less than 50 second-feet.

Electric power: 1,500 horsepower delivered from Williston steam power station.  
Construction of project authorized: November 18, 1904.  
Per cent completed: Entire project, 36; first unit, 100.

#### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 12,500 acres; first unit, 4,060 acres.  
Ownership of irrigable lands (whole project): Public, 1,400 acres; State, 91 acres; private, 11,000 acres.  
Lands irrigated season of 1909: Public, 94 acres; private, 1,599 acres.  
Character of soil of irrigable area: Ranges from sandy loam to heavy clay loam.  
Duty of water: 2 acre-feet per acre per annum at the farm.  
Principal products: Small grains, alfalfa, sugar beets, and vegetables.  
Principal markets: St. Paul, Minneapolis, and Duluth, Minn.; Chicago, Ill.

#### LANDS OPENED FOR IRRIGATION

Date of public notice: April 8, 1908.  
Location of lands opened: Tps. 152 and 153 N., Rs. 103 and 104 W., fifth principal meridian.  
Irrigable area opened: Public, 460 acres; State, 91 acres; private, 3,498 acres.  
Limit of area of farm units: Public, 80 acres; private, 160 acres.  
Building charge per acre of irrigable land: \$38.  
Annual operation and maintenance charge: \$0.70 per acre of irrigable land, and \$0.50 per acre-foot of water actually used.

#### GENERAL STATEMENT

A detailed description of the Buford-Trenton project may be found in the fifth annual report, and general descriptions of the project and of the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of the project provides for a pumping plant installed on a barge moored in Missouri River, lifting

water about 30 feet to a settling basin that discharges by gravity into a canal supplying water for the irrigation of low lands along the river between Buford and Trenton, and by means of a pumping plant at a permanent pumping station lifting water 50 feet into a high-line canal for the irrigation of bench lands near the same towns. The pumping plants are operated by electric power generated at a main power station on the Williston project, and delivered over a transmission line 28.3 miles in length. In the barge pumping plant there are four centrifugal pumps, each having a capacity of 30 second-feet, driven by four induction motors. In the secondary plant there are four centrifugal pumps, each having a capacity of 16 second-feet, two driven by induction motors and two by synchronous motors. Three 300-kilowatt, water-cooled transformers are used to lower the line voltage of 22,000 to the operating voltage of 2,200. Construction of the high-line canal was completed in 1907, and the pumps installed on the barge have sufficient capacity to supply water to the bottom lands, but construction on this portion of the canal system has not been commenced.

#### CONSTRUCTION

As the machinery first installed in the power station at Williston was intended to provide power for the operation of the Williston project only, plans were prepared for a 44-foot extension of the said power station to provide for the installation of one 500-kilowatt turbo-generator, a condenser, an exciter set, six additional switch-board panels and two 250-horsepower boilers for the generation of power for transmission to the Buford-Trenton pumping plants. The construction of the building and erection of machinery was carried on by force account during the winter and spring months and was completed May 1, 1909, in readiness for use during the operating season.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Buford-Trenton project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due—
134	Sept. 27, 1906	D'Oller Engineering Co.	Pumping machinery.	\$40,836.00	\$42,051.80	Dec. 21, 1907
213	Nov. 20, 1907	Marquette Cement Manufacturing Co.	Cement.....	96.92	96.92	May 1, 1908
224	Mar. 16, 1908	Universal Portland Cement Co.	.....do.....	384.75	384.75	Oct. 1, 1908
263	Dec. 1, 1908	Allis-Chalmers Co.....	Electric generator.	13,200.00	\$ 13,200.00	Feb. 26, 1909
274	Feb. 27, 1909	Universal Portland Cement Co.	Cement.....	128.25	128.25	Dec. 1, 1909

<sup>a</sup> Completed.

#### SETTLEMENT

Two entries embracing 94 acres of irrigable land have been made. No changes have occurred in the holdings of private lands. Seventeen water-right applications have been made for 1,599 acres of private lands.



## OPERATION

Practically all of the cultivated lands on the project were sown to small grains in the season of 1908. The value of early irrigation was not appreciated, and the farmers, although urged to do so, did not apply for water until early in July. The result was that owing to the prevalence of hot winds at that time a great amount of water was wanted in a short space of time and it was not possible to meet the demands. About 816 acres were actually irrigated, the total amount of water pumped and delivered being 873 acre-feet. While the results obtained from irrigation did not meet expectations, it was shown that the average yield was more than double that obtained by dry-farming methods. The irrigating season closed September 24, and the pumping barge was towed to the launching ways at Williston and hauled out.

In the season of 1909, the barge was launched April 5, towed to the intake station May 25, and the settling basin was filled and the pumps tested June 3. On June 30, no applications for water had been received.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Buford-Trenton project*

ASSETS			
Accounts receivable:			
Uncollected water-right building charges.....	\$9,599.78		
Uncollected water-right operation and maintenance charges.....	1,952.72		
			\$11,552.50
Inventories:			
Government animals.....	985.00		
Equipment in use.....	5,483.68		
Iron and steel.....	402.31		
Lumber.....	1.50		
Forage.....	138.83		
Fuel.....	16.00		
Local products.....	36.89		
Unadjusted transfers.....	a 4,465.46		
			2,598.75
Cost of work:			
Building cost.....	253,099.95		
Less adjustments.....	\$23.50		
Less accrued revenues.....	288.79		
		312.29	
			252,787.66
Operation and maintenance cost.....	9,300.80		
Less accrued revenues.....	31.75		
			9,269.05
Total assets.....			276,207.96
LIABILITIES			
Investment of the United States:			
Disbursement vouchers.....	\$287,927.01		
Transfer vouchers received.....	57,238.09		
		\$345,165.10	
Collection vouchers.....	882.45		
Transfer vouchers issued.....	93,293.09		
		94,175.54	
			\$250,989.56
Accounts payable:			
Unpaid labor.....	2,306.87		
Unpaid purchases.....	1,426.24		
Unpaid contract estimates.....	7,053.20		
Unpaid contract holdbacks.....	453.20		
Unpaid freight and express.....	1,977.69		
Unpaid passenger fares.....	25.70		
			13,242.90
Repayments accrued:			
Building.....	9,956.98		
Operation and maintenance.....	2,018.52		
			11,975.50
Total liabilities.....			276,207.96

a This is a credit amount.

*Feature costs to June 30, 1909, Buford-Trenton project*

<b>Power plant:</b>		
Excavation.....	\$965. 38	
Concrete.....	8, 102. 42	
Reinforced steel.....	178. 88	
Structural steel.....	592. 21	
Roofing.....	689. 81	
Mill work.....	364. 85	
Water conduits.....	1, 037. 63	
Machinery, installing and testing.....	49, 376. 44	
Temporary end in boiler room.....	349. 10	
Transmission line.....	23, 146. 28	
Pumping barge and ways.....	33, 436. 74	
Pumping station.....	31, 994. 88	
		<b>\$150, 234. 62</b>
<b>Distributing system, earthwork, and structures:</b>		
Settling basin.....	6, 571. 19	
Concrete pressure pipe.....	19, 179. 09	
Canals and structures.....	22, 788. 11	
Canal B.....	2, 154. 72	
Six-mile flume.....	702. 14	
		<b>51, 395. 25</b>
<b>Examination of project as a whole:</b>		
General preliminary cost.....	14, 542. 81	
Surveys.....	5, 737. 08	
Soil surveys.....	90. 73	
Investigation, stone quarry.....	140. 90	
Water system.....	923. 60	
		<b>21, 435. 12</b>
<b>Real estate (rights and property): Lands purchased</b>		<b>935. 32</b>
<b>Buildings:</b>		
Incidental structures.....	1, 156. 16	
Electrician's cottage.....	332. 91	
Engineer's cottage.....	1, 280. 00	
Bunk house.....	310. 00	
Coal shed.....	120. 00	
Water-tank house.....	235. 50	
		<b>3, 434. 57</b>
<b>Administration of project as a whole:</b>		
General expense.....	24, 969. 25	
Maintenance, headquarter's camp.....	594. 20	
		<b>25, 563. 45</b>
<b>Inventory of unused supplies.....</b>		<b>101. 62</b>
<b>Total building cost.....</b>		<b>253, 099. 95</b>
<b>Operation and maintenance:</b>		
Power plant.....	5, 687. 68	
Distribution system, earthwork, and structures.....	2, 072. 80	
Demonstration farm.....	41. 30	
Engineering expenses as a whole.....	1, 499. 02	
		<b>9, 300. 80</b>
<b>Total building and operation and maintenance cost, as per debit in cost of work in statement of assets and liabilities.....</b>		<b>262, 400. 75</b>

**LITTLE MISSOURI PROJECT**

A detailed description of the Little Missouri project is given in the fifth annual report.

The work now being done on this project consists of a reconnaissance along the Little Missouri, Knife, Heart, and Cannon Ball rivers and their tributaries, in order to locate and survey areas of moderate size on which it may be possible to develop gravity projects, and to locate and survey possible dam and reservoir sites. Surveys

on the south fork of the Cannon Ball were begun early in June, and by the end of the fiscal year three reservoir sites, with capacities aggregating about 18,000 acre-feet, and one irrigable bench area of 2,000 acres had been covered. Gaging stations maintained on these streams since 1903 show that storage must be provided in order to make satisfactory irrigation from them possible.

The total expenditures to June 30, 1909, amount to \$6,770.85.

### NESSON PROJECT

A detailed description of the Nesson project may be found in the sixth annual report, and general descriptions of the project and of the progress of investigations relating thereto are given in other annual reports.

During the year practically no additional stock subscriptions have been made in the Nesson Valley Water Users' Association, and the affairs of the project remain about as described in the sixth annual report.

The total expenditures for the project to June 30, 1909, amount to \$17,441.08.

### WASHBURN PROJECT

#### SUMMARY OF PRINCIPAL DATA

State: North Dakota.

Counties: McLean, Burleigh, and Oliver.

Townships: 143 and 144 N., Rs. 81 to 83 W., fifth principal meridian.

Sources of water supply: Missouri River and Turtle, Painted Woods, and Mandan Lake creeks.

Reservoirs: Painted Woods Lake—area, 800 acres; capacity, 3,000 acre-feet. Mandan Lake—area, 1,000 acres; capacity, 2,000 acre-feet.

Irrigable area: Whole project, 8,700 acres; Washburn unit, 3,700 acres; Oliver unit, 5,000 acres.

Ownership of irrigable lands (whole project): State, 480 acres; private, 8,220 acres.

#### GENERAL STATEMENT

A general description of the plans for the Washburn project is given in the seventh annual report. The details of the irrigation system for the project have not been decided upon, but the general plan provides for the development of two units, the Washburn and the Oliver. The Washburn unit extends 12 miles eastward from Washburn, N. Dak., on the north side of Missouri River and embraces about 2,000 acres of bench land, 1,700 acres of cleared bottom land and 1,500 acres of brush-covered bottom land in McLean and Burleigh counties. The Oliver unit extends from Mandan Lake to Missouri Coulee on the south side of Missouri River and embraces 2,200 to 4,000 acres of bench land, 1,800 acres of cleared bottom land, and 500 acres of brush-covered bottom land in Oliver County. The main water supply of both units would be secured from Missouri River by pumping, lignite coal mined in the vicinity being utilized for the generation of power. This water supply would be supplemented by the flow of Painted Woods and Turtle creeks on the Washburn unit and of Mandan Lake Creek on the Oliver unit. Three alternate plans of development for the Washburn unit and two for the Oliver unit have been prepared. Surveys were made during the fiscal year to determine the area of irrigable lands and to collect data on which to base estimates of the cost of construction.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Washburn project*

## ASSETS

Inventories:		
Equipment in use.....	\$1,337.33	
Storehouse.....	43.10	
Unadjusted transfers.....	57.94	
		\$1,438.37
Cost of work:		
Building cost.....	9,929.50	
Plus adjustments.....	67.58	
		9,997.08
Total assets.....		11,435.45

## LIABILITIES

Investment of the United States:		
Disbursement vouchers.....	\$9,781.57	
Transfer vouchers received.....	1,848.69	
		\$11,630.26
Collection vouchers.....	33.36	
Transfer vouchers issued.....	195.61	
		228.97
		\$11,401.29
Accounts payable:		
Unpaid labor.....	7.62	
Unpaid freight and express.....	23.54	
Unpaid passenger fares.....	3.00	
		34.16
Total liabilities.....		11,435.45

*Feture costs to June 30, 1909, Washburn project*

## WASHBURN UNIT

Preliminary examination:		
General topography, plane table.....	\$260.64	
General topography, stadia.....	171.48	
Level work, primary lines.....	122.46	
Level work, secondary line.....	35.10	
Location, stadia traverse.....	498.55	
Location, trial.....	969.67	
Canal topography.....	507.08	
Hydrography (soundings and ranges).....	967.36	
Coal investigation.....	1,209.94	
General expense.....	2,007.84	
Camp operation and maintenance.....	297.86	
		\$7,047.98

## OLIVER UNIT

Preliminary examination:		
General topography.....	269.73	
Stadia topography.....	763.09	
Level work, primary lines.....	134.43	
Level work, secondary lines.....	3.60	
Location, stadia traverse.....	87.39	
Location, trial.....	524.72	
Hydrography (soundings and ranges).....	365.59	
Coal investigations.....	29.06	
General expense.....	568.31	
Camp operation and maintenance.....	135.60	
		2,881.52

Total building cost as per debit in cost of work in statement of assets and liabilities..... 9,929.50

No allotment for this project has been made for the ensuing year and the question as to whether the project can be carried out has not yet been determined.

**WILLISTON PROJECT****LOCATION AND CLIMATIC CONDITIONS**

State: North Dakota.

County: Williams.

Townships: 153 to 155 N., Rs. 100 and 101 W., fifth principal meridian.

Railroad: Great Northern.

Railroad station: Williston, N. Dak.

Average elevation of irrigable area: 1,875 feet above sea level.

Average annual rainfall on irrigable area: 15 inches.

Range of temperature on irrigable area:  $-59^{\circ}$  F. to  $107^{\circ}$  F.

**WATER SUPPLY**

Source of water supply: Missouri River.

Area of drainage basin: 155,000 square miles.

Minimum recorded run-off of drainage basin: 4,000 second-feet.

**ENGINEERING DATA FOR COMPLETE PROJECT**

Length of canals: 3 miles with capacities less than 300 and greater than 50 second-feet, 45 miles with capacities less than 50 second-feet.

Steam power: 1,500 horsepower for Williston project and 1,500 horsepower for Buford-Trenton project.

Construction of project authorized: January 23, 1908.

Percent completed: Whole project, 64; first unit, 100.

**AGRICULTURAL CONDITIONS**

Irrigable area: Whole project, 12,000 acres; first unit, 8,047 acres.

Ownership of irrigable lands (whole project): Public, 433 acres; State, 67 acres; private, 11,500 acres.

Lands irrigated season of 1909: Private, 4,176 acres.

Character of irrigable area: Ranges from sandy loam to heavy clay loam.

Duty of water: 2 acre-feet per acre per annum at the farm.

Principal products: Small grain, alfalfa, sugar beets, and vegetables.

Principal markets: St. Paul, Minneapolis and Duluth, Minn.; Chicago, Ill.

**LANDS OPENED FOR IRRIGATION**

Dates of public notices: April 27 and November 30, 1908; April 30, 1909.

Location of lands opened: Tps. 154 and 155 N., Rs. 100 and 101 W., fifth principal meridian.

Irrigable area opened: Public, 112 acres; State, 67 acres; private, 7,868 acres.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: \$38.

Annual operation and maintenance charge: \$0.70 per acre of irrigable land, and \$0.50 per acre-foot of water actually used.

**GENERAL STATEMENT**

A detailed description of the Williston project may be found in the fifth annual report and general descriptions of the project and of the progress of work thereon are given in other annual reports.

Briefly, the irrigation plan of the first unit of this project provides for a central steam-turbine power plant operating pumps and generating electricity for the operation of pumping plants; a series of motor-driven centrifugal pumps on a barge in Missouri River; a settling basin receiving water from the barge pumping plant; a main canal extending from the settling basin along Little Muddy Creek to the power plant; a pumping station having electrically driven pumps which lift water from the main canal to a high-line canal, and a second

pumping station having electrically driven pumps lifting water from this high-line canal to a higher canal; and two sets of steam-driven pumps, located in the central power house, which lift water from the end of the main canal to a high-line canal. The canals leading from the several stations deliver water on land in the valley of Little Muddy Creek in the vicinity of Williston, N. Dak. The power station is conveniently located adjacent to a vein of lignite coal from which fuel is obtained. This station generates electrical power which is delivered over a transmission line to the Buford-Trenton project.

Construction work on the first unit of the project was completed early in 1908. Future development contemplates the extension of the present canal system, the construction of a second intake station and the necessary canals and laterals to supply water to lands bordering on Missouri River near Williston.

#### CONSTRUCTION AND SURVEYS

No additional construction or survey work has been undertaken during the fiscal year, but preliminary plans and estimates have been prepared for the proposed canal systems for lands along Missouri River near Williston.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Williston project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
123	Sept. 5, 1906	D'Olier Engineering Co..	Power and pump- ing system.	\$76,229.50	\$82,237.92	Oct. 5, 1907
136	Sept. 26, 1906	Henry C. DeLaney.....	Canals and struc- tures.	81,867.00	88,351.54	Sept 15, 1907
213	Nov. 20, 1907	Marquette Cement Man- ufacturing Co.	Cement.....	103.46	103.46	May 1, 1908
224	Mar. 16, 1908	Universal Portland Ce- ment Co.	.....do.....	142.50	142.50	Oct. 1, 1908

<sup>a</sup> Completed.

#### PUBLIC NOTICE DATED NOVEMBER 30, 1908

On April 27, 1908, public notice was issued in pursuance of the act of Congress approved June 17, 1902 (32 Stat. L., 388), in connection with the Williston project, North Dakota, announcing that water would be furnished in the irrigation season of 1908 for the irrigable lands shown upon the farm-unit plats of T. 154 N., Rs. 100 and 101 W., and T. 155 N., R. 100 W.

The said notice further announces that for lands entered thereafter the installment of the water-right charges for the second year shall be due and payable May 1, 1909, and for subsequent years on or before May 1 of each year, and that for lands in private ownership the first installment shall be due and payable May 1, 1908.

In view of the fact that it was found impracticable to furnish an adequate and continuous supply of water throughout the irrigation season of 1908, it has been decided to amend the said notice, and the provisions thereof are hereby amended as follows:

For lands entered after April 27, 1908, the installment of the water-right charge for the second year shall be due and payable December 1, 1909, and for subsequent

years on or before December 1 of each year, and for lands in private ownership and lands entered on or before April 27, 1908, the first installment of the water-right charge shall be due and payable December 1, 1908, and subsequent installments on December 1 of each year thereafter.

No water will be furnished in the year of 1909 unless the part of the installment covering the fixed charge for operation and maintenance, 70 cents per acre of irrigable land, due and payable December 1, 1908, shall have been paid.

The public notice of April 27, 1908, also announces that the charges for the building of the irrigation system are payable in not less than five nor more than ten annual installments. This provision is hereby modified so that the said charges shall be payable in not more than ten annual installments; provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

All the provisions of the public notice of April 27, 1908, shall remain in full force and effect except as modified herein.

This notice was referred to the Commissioner of the General Land Office with instructions that appropriate action be taken for putting the provisions thereof into effect, and with authority for its publication in newspapers at Williston, N. Dak.

#### PUBLIC NOTICE DATED APRIL 30, 1909

By the terms of the public notice issued April 27, 1908, for the Williston project, North Dakota, the following regulation was established:

That no water will be furnished in any year until all operation and maintenance charges for preceding years have been paid, including the fixed charge and the charge for water furnished.

The public notice of November 30, 1908, provides that—

“No water will be furnished in the year 1909 unless the part of the installment covering the fixed charge for operation and maintenance, 70 cents per acre of irrigable land, due and payable December 1, 1908, shall have been paid.

The operation of the above provisions is hereby suspended for the irrigation season of 1909, so that payment of any portion of the installment for operation and maintenance shall not be a prerequisite to the delivery of water for the season of 1909.

The effect of this order is that if the charges for building and for operation and maintenance due December 1, 1908, are not paid on or before December 1, 1909, when the second installment becomes due, the entry or the water-right application of both, as the case may be, shall be subject to cancellation with the forfeiture of all rights under the act as well as of any moneys paid thereon.

This suspension shall apply to the season of 1909 only, and no water will be furnished in the year 1910 until all operation and maintenance charges then due shall have been paid.

#### OPERATION AND MAINTENANCE.

During the season of 1908, 54 water-right applications were received for an aggregate of 3,604 acres of land in private ownership. The value of early irrigation was not appreciated by the farmers and but few applications were received until the months of June and July. Exceedingly dry and hot weather then prevailed and there was a demand for the immediate delivery of a quantity of water that it was found impossible to supply. The results obtained during the first irrigating season did not, therefore, meet expectations, but the irrigated crops yielded more than double those raised under dry-farming methods. The impossibility of the ordinary farmer handling 160 acres of irrigated land in an efficient manner was clearly demonstrated, and it is now generally conceded that 80 acres is ample for a farm unit. The total amount of water pumped and delivered during the season of 1908 was 2,098 acre-feet, which was distributed

over about 1,050 acres of land. At the close of the season the pumping-plant barge was hauled out of the river.

The barge was launched for use in the irrigation season of 1909 on April 5, the first water was pumped May 13, and the first delivery of water made May 24. A total of 191 acre-feet of water had been pumped and delivered to 18 farms by the end of June, all applications having been promptly and satisfactorily met. Crops were in excellent condition at the end of the fiscal year, and although there have been frequent rains the lands irrigated in the fall and spring are producing decidedly better crops than those that have not been irrigated.

At the end of the fiscal year a total of 66 water-right applications for an aggregate of 4,176 acres of private lands had been received.

### COAL MINE

Considerable difficulty was experienced during the season of 1908 in mining the necessary amount of coal from 7-foot entries to meet the requirements of the power plant. During the season of 1909 the mining has been done on the stub-entry system, and at the end of the fiscal year the mine was so far developed that about 50,000 tons of coal can be removed without making further extensions of the 7-foot entries. Prior to June 30, 1909, 2,455 tons of coal had been mined this season, making a total production for the fiscal year of 8,056 tons. About 500 tons of coal are in storage for use in case of emergency.

### FINANCIAL STATUS

#### *Assets and liabilities on June 30, 1909, Williston project*

ASSETS		
Accounts receivable:		
Uncollected water-right building charges.....	\$22,864.41	
Uncollected water-right operation and maintenance charges.....	4,218.87	
		\$27,083.28
Inventories:		
Mercantile store.....	222.77	
Government animals.....	1,385.00	
Equipment in use.....	12,166.42	
Storehouse.....	1,444.13	
Iron and steel.....	282.88	
Lumber.....	135.20	
Forage.....	196.32	
Fuel.....	1,315.77	
Local products.....	113.73	
Unadjusted transfers.....	6,227.52	
		23,489.74
Cost of work:		
Building cost.....	437,713.54	
Less adjustments.....	\$285.81	
Less accrued revenues.....	359.95	
	645.76	
		437,067.78
-Operation and maintenance cost.....	45,832.74	
Less accrued revenues.....	165.00	
		45,667.74
Total assets.....		533,308.54
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	\$466,268.67	
Transfer vouchers received.....	73,457.29	
	\$539,725.96	
Collection vouchers.....	3,324.49	
Transfer vouchers issued.....	34,791.80	
	38,116.29	
		\$501,609.67



<b>Accounts payable:</b>		
Unpaid labor.....	\$3,078.96	
Unpaid purchases.....	489.26	
Unpaid contract holdbacks.....	472.62	
Unpaid passenger fares.....	2.60	
Unredeemed coupon books.....	47.40	
Unredeemed meal tickets.....	56.75	
Unpaid miscellaneous.....	430.20	
		\$4,577.69
<b>Repayments accrued:</b>		
Building.....	22,902.41	
Operation and maintenance.....	4,218.87	
		27,121.28
<b>Total liabilities.....</b>		<b>533,308.54</b>

*Feature costs to June 30, 1909, Williston project*

Coal mine: Development.....		\$12,480.36
<b>Power plant:</b>		
Power house, station 1.....	\$142,455.89	
Transmission line.....	14,627.56	
Transformer station at barge.....	2,423.38	
Pumping barge, station 3.....	33,916.64	
Pumping station 2.....	12,375.75	
Pumping station 4.....	7,222.81	
Floating boom at barge.....	685.82	
Scow pontoon.....	1,220.70	
		214,928.55
<b>Distribution system (earthwork and structures):</b>		
Canals and laterals.....	120,107.44	
Equalizing reservoir.....	1,067.51	
Spillway at reservoir.....	500.73	
Turnout at reservoir.....	216.05	
Diverting structures.....	520.67	
Sluicing boat.....	763.62	
Bank protection at settling basin.....	102.83	
		123,278.85
<b>Buildings:</b>		
Incidental structures.....	1,399.93	
Office building.....	1,998.52	
Mess house.....	948.09	
Engineer's cottage at power house.....	1,398.44	
Storehouse and granary.....	250.00	
Temporary machine shop.....	675.63	
Bath house at mine.....	600.89	
Coal storage structure.....	823.83	
Barn at power house.....	786.64	
Mess house at power house.....	154.59	
Office at power house.....	1,713.72	
Commissary building at power house.....	543.86	
Maintenance headquarters camp.....	1,506.60	
		12,800.74
Real estate (rights and property): Lands purchased.....		3,484.98
<b>Irrigable lands:</b>		
Soil survey.....	5,742.17	
Farm-unit survey.....	136.96	
Survey east and west bottom.....	982.25	
Land restoration.....	649.96	
		7,511.34
Examination of project as a whole: Preliminary surveys.....		19,879.08
Administration of project as a whole: General expense.....		43,349.64
Total building cost.....		437,713.54
<b>Operation and maintenance:</b>		
Power plant.....	39,075.42	
Distribution system.....	4,543.61	
Engineering expense.....	2,213.71	
		45,832.74
<b>Total building and operation and maintenance cost, as per debit in cost of work in statement of assets and liabilities.....</b>		
		<b>483,546.28</b>

## **NORTH DAKOTA-SOUTH DAKOTA**

### **BOWMAN PROJECT**

#### **LOCATION AND CLIMATIC CONDITIONS**

Counties: Bowman and Adams, N. Dak.; Butte, S. Dak.  
Townships: 129 N., Rs. 98 to 101 W., fifth principal meridian; 23 N., Rs. 8 to 10 E., Black Hills meridian.  
Railroad: Chicago, Milwaukee and St. Paul.  
Railroad stations: Bowman, Buffalo Springs, Scranton, Gascoyne, and Reeder, N. Dak.  
Average elevation of irrigable area: 2,700 feet above sea level.  
Average annual rainfall on irrigable area: 13 inches.  
Range of temperature on irrigable area:  $-40^{\circ}$  F. to  $100^{\circ}$  F.

#### **WATER SUPPLY**

Source of water supply: North Fork of Grand River and Spring Creek.  
Area of drainage basin: 400 square miles.  
Average annual rainfall on drainage basin: 13 inches.

#### **ENGINEERING DATA FOR COMPLETE PROJECT**

Reservoir: Area, 1,700 acres; capacity, 20,000 acre-feet.  
Storage dam: Type, earth fill; maximum height, 45 feet; length of crest, 4,000 feet; contents, 300,000 cubic yards.  
Length of canals: No canals with capacities greater than 300 second-feet; 25 miles with capacities less than 300 and greater than 50 second-feet; 27 miles with capacities less than 50 second-feet.

#### **AGRICULTURAL CONDITIONS**

Irrigable area (whole project): 10,000 acres.  
Ownership of irrigable lands (whole project): Practically all public.  
Character of soil of irrigable area: Sandy loam.  
Principal products: Grain, hay, and vegetables.  
Principal markets: Local.

#### **GENERAL STATEMENT**

A brief description of the Bowman project is given in the seventh annual report. The lands of the project lie in the narrow valley of North Fork of Grand River in the southwest part of North Dakota and the northwest part of South Dakota. The irrigation plan contemplates the storage of the waters of North Fork of Grand River and the waters of Spring Creek in a reservoir at the junction of these streams, and the distribution of the stored water by means of two canals, one on either side of the river, watering about 10,000 acres of irrigable land.

#### **SURVEYS**

In 1906 a reconnaissance of this project was made by the state engineer of North Dakota, the result of his investigations being given in his annual report of that year. Preliminary surveys were made by the Reclamation Service, August to November, 1908. Stations for the observation of precipitation were established in 1908 near the

reservoir site and several miles below Haley. A gaging station was established at Haley, on North Fork of Grand River, in August, 1908.

#### IRRIGATION PLAN

The controlling feature in the development of the irrigation plan for the Bowman project is the available water supply. Sufficient data are not at hand to make an accurate estimate of the discharge of the North Fork of Grand River, but the records of adjacent streams indicate that an annual run-off of about 15,000 acre-feet may be expected.

#### CONDITIONS OF SETTLEMENT

The lands in the Bowman project are practically all in private ownership or taken up under homestead filings. The settlers whose lands would be watered by the proposed canals have been asked to state whether they desire irrigation at a probable cost of \$50 per acre, and of those who have replied, 92 per cent have expressed themselves as desiring the construction of the project.

#### FINANCIAL STATUS

##### *Assets and liabilities on June 30, 1909, Bowman project*

ASSETS	
Inventories:	
Government animals.....	\$464.99
Equipment in use.....	719.22
Unadjusted transfers.....	20.84
	<hr/>
	\$1,205.05
Cost of work: Building cost.....	3,283.21
	<hr/>
Total assets.....	4,488.26
LIABILITIES	
Investment of the United States:	
Disbursement vouchers.....	\$3,220.41
Transfer vouchers received.....	1,266.70
	<hr/>
	\$4,487.11
Collection vouchers.....	.50
Transfer vouchers issued.....	47.50
	<hr/>
	48.00
	<hr/>
	\$4,439.11
Accounts payable:	
Unpaid labor.....	30.00
Unpaid passenger fares.....	19.15
	<hr/>
	49.15
	<hr/>
Total liabilities.....	4,488.26

##### *Feature costs to June 30, 1909, Bowman project*

Examination of project as a whole:	
Preliminary surveys.....	\$973.28
Rock investigation.....	241.14
Gaging streams.....	123.56
	<hr/>
	\$1,337.98
Administration of project as a whole:	
General expense.....	1,791.59
Maintenance of camp.....	147.30
	<hr/>
	1,938.89
Irrigable lands: Soil surveys.....	6.34
	<hr/>
Total building cost, as per debit in cost of work in statement of assets and liabilities.....	3,283.21

No allotment for the project has been made for the ensuing year and the question as to whether the project can be carried out has not yet been determined.

# OKLAHOMA

## CIMARRON PROJECT

### GENERAL STATEMENT

General information relating to the Cimarron project may be found in other annual reports.

During the fiscal year studies of irrigation possibilities in connection with the Cimarron project have been in progress, and from the information available it is believed that it will not be feasible to attempt to store water on Cimarron River. The construction of a diversion dam of such character as to cut off all underflow and to intercept surface flow would be feasible, but as the flow of the stream is very small, except during the irregular and widely separated floods, irrigation would be irregular and suited only to crops susceptible of withstanding long periods of drought. The prevalence of rainfall throughout the spring and early summer obviates to a large extent the desirability of an irrigation water supply such as could be provided.

### FINANCIAL STATUS

#### *Assets and liabilities on June 30, 1909, Cimarron project*

ASSETS			
Inventories:			
Equipment in use.....	\$515.21		
Unadjusted transfers.....	7.62		
			\$522.83
Cost of work:			
Building cost.....		6,907.24	
Total assets.....			7,430.07
LIABILITIES			
Investment of the United States:			
Disbursement vouchers.....	\$6,749.62		
Transfer vouchers received.....	265.33		
		\$7,014.95	
Transfer vouchers issued.....		26.55	
			\$6,988.40
Accounts payable:			
Unpaid labor.....	352.75		
Unpaid purchases.....	1.15		
Unpaid passenger fares.....	87.77		
			441.67
Total liabilities.....			7,430.07

#### *Feature costs to June 30, 1909, Cimarron project*

Preliminary examination and surveys.....	\$6,907.24
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### RED RIVER PROJECT

A general description of the Red River project may be found in the second annual report. The work done on the project during the fiscal year has consisted mainly in the gaging of streams. The total expenditures to June 30, 1909, have amounted to \$60,215.12.

# OREGON

## CENTRAL OREGON PROJECTS

### GENERAL STATEMENT

Descriptions of proposed irrigation developments in central Oregon are given in the third and other annual reports.

In August, 1908, reconnaissance covering in part projects previously reported on, but much more complete and thorough than investigations previously attempted, was begun in central and eastern Oregon. A number of possible irrigation projects were examined with considerable care and many new gaging stations were established along the more important streams in central Oregon.

Irrigation projects in the Deschutes River basin on Crooked, Ochoco, Tumalo, and Rosland rivers; in the interior basin on Chewaucan, Ana, Pauline, Rock Fort, Silvies, and Blitzen rivers and Silver Creek; in the Snake River basin on Powder River; and in the Columbia River basin on John Day and Umatilla rivers were investigated. Special examinations were also made in connection with power possibilities on the Deschutes, Metolius, Crooked, John Day, Chewaucan, Powder, Malheur, and Owyhee rivers. These reconnaissance investigations were completed about the end of 1908, and a report based thereon was completed in April, 1909. In addition, designs for the more important structures and inquiries as to the status of lands and water rights have been made on proposed extensions of the Umatilla project.

### FINANCIAL STATUS

#### *Assets and liabilities on June 30, 1909, Central Oregon projects*

#### ASSETS

Cost of work:	
Building cost.....	\$37,002.25

#### LIABILITIES

Investment of the United States:		
Disbursement vouchers.....	\$36,198.44	
Transfer vouchers received.....	1,484.53	
		\$37,682.97
Collection vouchers.....	428.58	
Transfer vouchers issued.....	252.14	
		680.72
		\$37,002.25

#### *Feature costs to June 30, 1909, Central Oregon projects*

Preliminary examination and surveys.....	\$37,002.25
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### MALHEUR PROJECT

General descriptions of the Malheur project are given in the third and other annual reports. As noted in the fifth annual report, work was indefinitely postponed in the early part of 1906, but during the summer and fall of 1908 some reconnaissance trips over the irrigable land and to the various proposed reservoirs, and some study of a

small project for the irrigation of lands north of Malheur River and on Dead Ox flat, were made. In March, 1909, filings were made on the unappropriated waters of Malheur and Owyhee rivers and their tributaries under the Oregon state laws of 1905 and 1909. On April 21 the Secretary of the Interior authorized further investigations. Project headquarters were therefore established in Ontario, Oreg., and active field and office investigations were begun. A feasible irrigation plan including several alternative developments was outlined, and reports and estimates thereon have been made.

The expenditures to June 30, 1909, amount to \$77,903.82.

## UMATILLA PROJECT

### LOCATION AND CLIMATIC CONDITIONS

State: Oregon.

County: Umatilla.

Townships: 4 and 5 N., Rs. 28 and 29 E., Willamette meridian.

Railroads: Oregon Railroad and Navigation Company; Northern Pacific.

Railroad stations: Hermiston and Umatilla.

Average elevation of irrigable area: 470 feet above sea level.

Average annual rainfall on irrigable area: 9 inches.

Range of temperature on irrigable area:  $-28^{\circ}$  F. to  $115^{\circ}$  F. (ordinary minimum,  $0^{\circ}$  F.)

### WATER SUPPLY

Source of water supply: Umatilla River.

Area of drainage basin: 1,610 square miles.

Average elevation of drainage basin: 2,000 feet above sea level.

Average annual rainfall on drainage basin: 20 inches.

Average annual run-off of drainage basin: 530,000 acre-feet.

### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Cold Springs—area, 1,500 acres; capacity, 50,000 acre-feet; length of spillway, 330 feet; elevation of spillway, 90 feet above stream bed.

Storage dam: Cold Springs—type, earth fill; maximum height, 98 feet; length of crest, 3,500 feet; contents, 757,000 cubic yards earth and gravel, 32,500 cubic yards rock fill, and 3,900 cubic yards concrete.

Diversion dam: Type, concrete weir; maximum height, 2.5 feet; length of masonry, 400 feet; length of earth fill, 780 feet.

Length of canals: 25 miles with capacities of 300 second-feet; 8 miles with capacities less than 300 and greater than 50 second-feet; 100 miles with capacities less than 50 second-feet.

Reinforced concrete pipe: 11,300 feet of 46-inch and 11,000 feet of 30-inch pipe laid; 9,800 feet of 46-inch and 6,500 feet of 30-inch pipe in process of construction.

Construction of project authorized: December 4, 1905.

Per cent completed: Entire project,  $85\frac{1}{2}$ ; Hermiston unit, 100; second unit, 90.

### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 20,440 acres; Hermiston unit, 6,823 acres; second unit, 4,392 acres.

Ownership of irrigable lands (whole project): Public, 10,588 acres; railroad, 1,800 acres; private, 8,052 acres.

Lands irrigated season of 1909: Public, 200 acres; private, 1,500 acres.

Character of soil of irrigable area: Sandy loam and volcanic ash.

Duty of water: 2.8 acre-feet per acre per annum at the farm.

Principal products: Alfalfa, fruits, berries, vegetables.

Principal markets: Portland, Oreg., and Spokane, Wash.

### LANDS OPENED FOR IRRIGATION

Dates of public notices and orders relating thereto: December 27, 1907; August 3, 1908; November 12, 1908; April 3, 1909.

Location of lands opened: Tps. 4 and 5 N., Rs. 28 and 29 E., Willamette meridian.

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Irrigable area opened: Public, 5,565 acres; railroad, 398 acres; private, 5,252 acres.  
 Limit of area of farm units: Public, 40 acres; private, 160 acres.  
 Building charge per acre of irrigable land: \$60.  
 Annual operation and maintenance charge: \$1.30 per acre of irrigable land.

#### GENERAL STATEMENT

A detailed description of the Umatilla project may be found in the fifth annual report, and general descriptions of the project and of the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of the project provides for a diversion dam on Umatilla River about 2 miles above Echo, Oreg., a storage reservoir controlled by the Cold Springs dam, an inlet canal connecting the diversion dam with the storage reservoir, an outlet canal leading from the storage reservoir, a by-pass canal connecting the inlet and outlet canals, and a distributing system supplied by the outlet canal and watering lands in the Umatilla and Columbia River valleys near Hermiston, Oreg. The diversion dam, the inlet canal, the Cold Springs dam, and a large portion of the distributing system are completed and in use.

#### INLET CANAL

On account of seepage which threatened the stability of the road-bed of the Oregon Railroad and Navigation Company between Echo and Fosters, 4,100 feet of full concrete lining and 2,000 feet of side lining were placed in the inlet canal during the summer of 1908. Delivery of water through the canal was begun November 1, 1908, and was continued until June 6, 1909. A total of 49,000 acre-feet was diverted from the river, of which nearly 40,000 acre-feet reached the Cold Springs reservoir and 1,000 acre-feet was diverted through the by-pass canal.

#### DISTRIBUTION SYSTEM

During the winter of 1908-9, laterals involving 60,000 cubic yards of excavation were built and 6,600 feet of 46-inch and 8,000 feet of 30-inch reinforced concrete pipe were laid by force account. The work of making 9,800 feet of 46-inch and 6,500 feet of 30-inch reinforced concrete pipe is in progress. The concrete pipe lines in use have proved very satisfactory.

Minor repairs have been made to the Maxwell system and 30 second-feet of water are now being diverted through it.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Umatilla project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1909.	Completion due—
71	Oct. 25, 1905	Pacific Portland Cement Co.	Cement.....	\$9,022.70	\$7,362.50	
94	June 12, 1906	do.....	do.....	6,000.00	5,992.30	July 1, 1907
140	Oct. 15, 1906	do.....	do.....	18,000.00	17,301.25	June 1, 1908
231	Apr. 2, 1908	Western Building Material Co.	do.....	1,000.00	806.30	Oct. 1, 1908

## ORDER DATED AUGUST 3, 1908

The public notice issued December 27, 1907, of lands irrigable under the Umatilla project, Oregon, constructed in pursuance of the reclamation act of June 17, 1902 (32 Stat. L., 388), is hereby modified as follows in so far as the said notice relates to the time when installments shall be due and payable, namely:

The first payment on account of the charges for all irrigable areas shown on the plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable at the local land office at La Grande, Oreg., on or before December 1, 1908, the total payment for building and operation and maintenance being not less than \$7 per acre.

The installments of the building charge, \$6 per acre, for subsequent years shall be due and payable at the same place on or before December 1 of each year, and until further notice the operation and maintenance charge of \$1 per acre of irrigable land shall be due and payable at the same time and place.

No water will be furnished to lands in any irrigation season unless all parts of installments for operation and maintenance for preceding years have been paid.

The terms of the public notice of December 27, 1907, are to remain in full force and effect except as modified by this order.

## PUBLIC NOTICE DATED NOVEMBER 12, 1908

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the Umatilla project, Oregon, under the provisions of the reclamation act, in the irrigation season of 1909, for the irrigable land shown on farm-unit plats of T. 4 N., R. 28 E.; T. 5 N., R. 28 E.; T. 4 N., R. 29 E.; T. 5 N., R. 29 E., Willamette meridian, approved November 11, 1908, by the Secretary of the Interior, and on file in the local land office at La Grande, Oreg.

Homestead entries accompanied by applications for water rights, and the first installment of the building, and operation and maintenance charges, may be made under the provisions of said act for the farm units shown on the said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership and the time when payments will be due is hereinafter stated.

The limit of area per entry, representing the acreage which in the opinion of the Secretary of Interior may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amount shown upon the plats for the several farm units.

The limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership which can be irrigated by the waters from the said irrigation project are in two parts, as follows:

1. The building of the irrigation system, \$60 per acre of irrigable land, payable in not more than ten annual installments, each payment not less than \$6 per acre or some multiple thereof, provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not. The operation and maintenance charge for the irrigation season of 1909 and until further notice, will be \$1.30 per acre of irrigable land whether water is used thereon or not.

For lands hereafter entered, the first installment on account of the said charges for the irrigable lands shown on these plats shall be paid for the season of 1909 at the local land office at La Grande, Oreg., at the time of entry and of filing water-right application, the total payment being not less than \$7.30 per acre. The second installment shall be due and payable December 1, 1910, at the same place. Subsequent installments shall be due and payable on December 1 of each year at the same place.

For lands in private ownership and for lands heretofore entered, the first installment shall be due and payable December 1, 1909, and the installments for the year 1910 and subsequent years shall be due and payable on the same date and at the same place.

The first installment of the charges for all irrigable areas shown on these plats whether or not water-right application is made therefor or water is used thereon shall be due and payable as herein provided.



The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1910 for any lands, unless the portion of the instalment for operation and maintenance due and payable on or before December 1, 1909, has been paid on or before April 1, 1910, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before April 1 of that year of the portion of the instalment for operation and maintenance which was due and payable on December 1 of the preceding year.

For all applications for water rights filed after June 15, in 1909 or any subsequent year, one instalment of the charge for building, operation and maintenance, \$7.30 per acre must be paid at the time of filing, but the portion of the instalment for operation and maintenance shall be credited on account of the instalment of said charges for the subsequent year.

If any instalment of the charges shall not have been paid in full on or before December 1 of the year subsequent to that in which it is due and payable as herein provided, it shall then become delinquent and under the terms of section 5 of the reclamation act the entry and water-right application shall be subject to cancellation with the forfeiture of any moneys paid thereon.

The charges herein provided may for the convenience of the applicants be paid to the special fiscal agent of the United States Reclamation Service assigned to the Umatilla project, for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office, but in case this privilege is availed of, the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

This notice was sent to the General Land Office, directing that it be forwarded with the plats to the register and receiver of the local land office at La Grande, Oreg., with instructions for conforming to the farm units the homestead entries made or to be made which are subject to the provisions of the reclamation act, and to announce that water-right applications must be filed in the proper form in the local land office before water can be furnished; that the United States will operate and maintain the storage and diversion works and main canals as shown on a plat of the project approved by the Director of the Reclamation Service, a copy of which is on file with the engineer in charge of the project, the cost thereof to be included in the operation and maintenance charges, and that the necessary laterals and sublaterals constituting the balance of the distributing system are to be operated and maintained by the water users to be served therefrom at their own expense under regulations to be approved by the Secretary of the Interior; that the amount of water to be furnished, to be stated in the second paragraph of every application, is 2.8 acre-feet per acre per annum; that the building charge and number of annual instalments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence in the neighborhood has been fixed at 20 miles, and that the Secretary of the Interior has entered into a contract with the Umatilla Water Users' Association and the certificate of that association forming part of the water-right application must be filled in before the application can be accepted.

#### PUBLIC NOTICE DATED NOVEMBER 12, 1908

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice was given under date of December 27, 1907, of the furnishing of water from the Umatilla project, Oregon, for the following lands: Tps. 4 and 5 N., R. 28 E., and Tps. 4 and 5 N., R. 29 E., Willamette meridian, and setting forth the conditions and charges governing the furnishing of water to irrigable lands contained therein.

In paragraph numbered "1" of said notice the number of instalments of the building charge is stated at not less than five nor more than ten. This is hereby modified

so that payments of the building charge may be made in any number of instalments not exceeding ten, each being not less than \$6 per acre or some multiple thereof; provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

Paragraph numbered "2" of said notice specified the amount of the portion of the annual instalment for operation and maintenance. The development of the project has shown that the necessary annual charge for operation and maintenance will exceed that assessed for the year 1908.

Therefore: Notice is hereby given that for the irrigation season of 1909 and until further notice the portion of the instalment for operation and maintenance will be \$1.30 per acre of irrigable land, whether water is used thereon or not, the charge for the season of 1909 being a portion of the instalment due and payable December 1, 1909, and similarly for subsequent years. No water will be furnished in any year unless the portion of the annual instalment for operation and maintenance then due shall have been paid on or before April 1. Accordingly no water will be furnished for the irrigation season of 1909 for any land unless the portion of the instalment for operation and maintenance due and payable on or before December 1, 1908 (\$1 per acre), has been paid on or before April 1, 1909, and no water will be furnished in 1910 unless the portion for operation and maintenance due and payable on or before December 1, 1909 (\$1.30 per acre), has been paid on or before April 1, 1910.

Charges may be paid to the special fiscal agent of the United States Reclamation Service at Hermiston, Oreg., on or before the dates specified for payment at the local land office, but in case this privilege is availed of, the necessary charge for the transportation of the cash, as determined by the special fiscal agent, must accompany the payment of such charges.

The public notice of December 27, 1907, shall remain in full force and effect except as herein modified.

This notice was sent to the General Land Office for transmission to the register and receiver of the local land office at La Grande, Oreg., with instructions that full publicity be given to the same.

#### NOTICE DATED NOVEMBER 25, 1908

On November 25, 1908, the Secretary of the Interior forwarded to the General Land Office an approved plat of lands in T. 5 N., R. 29 E., Willamette meridian, which *may* be placed under irrigation in 1909. Water-right applications will not be received for the lands shown on the plat until it shall have been definitely ascertained that water will be available, when public notice will be given of the irrigable areas in each farm unit. In the meantime, all prior entrymen, in order to acquire rights under the project, will be required to conform their holdings to the farm-unit designations shown on the plat, and homestead entries may be made for the vacant public lands in accordance with the farm units shown on the plat.

#### PUBLIC NOTICE DATED APRIL 3, 1909

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given that water will be furnished from the Umatilla project, Oregon, under the provisions of the reclamation act in the irrigation season of 1909 for the irrigable lands shown on farm-unit plat of T. 5 N., R. 29 E., Willamette meridian, approved March 30, 1909, by the Secretary of the Interior and on file in the local land office at La Grande, Oreg.

In accordance with the terms of the notice issued November 25, 1908, the manner of applying for water rights, the amount of the charges to be assessed, and the time when payments become due will be as set forth in the public notice dated November 12, 1908, covering neighboring lands under the Umatilla project.

### OPERATION

Over the greater portion of the Hermiston unit water service was regularly maintained during the season of 1908, except for a day or two during and just after each of the more violent dust storms. Thirty miles of main laterals were in use, and 13,000 acre-feet of water had been turned into the distribution system when service of water was discontinued, September 17, 1908.

For the season of 1909 water was first delivered in the latter part of March, and service has since been maintained with regularity. Thirty-five miles of main laterals are in use, and on June 30, 16,500 acre-feet of water had been distributed and 23,000 acre-feet were stored in the reservoir.

Winds have caused considerable trouble by eroding the canal banks and by filling the water section with drifted soil. This trouble has been overcome to a great extent by the growing of rye along the right of way, and by protecting the canal banks with rows of sage brush.

### SETTLEMENT

Settlement of the project is somewhat delayed on account of the comparatively large area held by desert-land entrymen who, under the present rulings, can not obtain patent to their lands until after full payment of the building charges. Under these conditions the subdivision and sale of land is difficult, and the difficulty is greatly increased because of the high price at which unimproved land is held. Homesteads are in great demand and are promptly filed upon. The common price for a relinquishment seems to be from \$25 to \$30 an acre for raw land. Excluding town lots and acre tracts near Hermiston, water-right applications have been made for 165 holdings, aggregating 5,600 acres. Hermiston, located in the midst of the irrigable lands, is a well-built town of about six hundred inhabitants. Between eight and nine hundred people are living on the project, nearly all of whom have settled there during the past two years.

### AGRICULTURAL DEVELOPMENT

Fair progress in agricultural development is being made on the area irrigated. About 250 acres of alfalfa, seeded prior to the present season, will yield from five to six tons to the acre. A few tracts seeded this spring will probably yield one good cutting of alfalfa this fall. About 300 acres of orchards and vineyards are well established. A large portion of the land will first be put in alfalfa, both because alfalfa thrives well and is remunerative and because of its beneficial effect on the soil. There is a firm market for much more alfalfa than can be raised for some time to come, and the price this year is from \$10 to \$12 a ton in the stack.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Umatilla project*

## ASSETS

Accounts receivable:			
Uncollected water-right building charges.....	\$64,872.00		
Uncollected water-right operation and maintenance charges.....	8,498.00		
			\$73,358.00
Inventories:			
Equipment in use.....	54,702.26		
Storehouse.....	46.19		
Cement.....	604.99		
Iron and steel.....	5,581.99		
Lumber.....	571.89		
Forage.....	199.31		
Fuel.....	610.62		
Local products.....	1,197.20		
Unadjusted transfers.....	680.36		
			64,194.81
Cost of work:			
Building cost.....	\$1,011,007.06		
Plus adjustments.....	93.51		
		1,011,100.57	
Less accrued revenues.....		1,281.22	
			1,009,819.35
Operation and maintenance cost.....	35,078.36		
Less accrued revenues.....	1,375.00		
			33,703.36
Total assets.....			1,181,075.52

## LIABILITIES

Investment of the United States:			
Disbursement vouchers.....	\$1,097,721.47		
Transfer vouchers received.....	23,777.40		
		\$1,121,498.87	
Collection vouchers.....	19,054.65		
Transfer vouchers issued.....	31,377.68		
		50,432.33	
			\$1,071,066.54
Accounts payable:			
Unpaid labor.....	5,008.40		
Unpaid purchases.....	11,047.55		
Unpaid freight and express.....	13,462.95		
Unpaid passenger fares.....	175.43		
Unredeemed coupon books.....	7.75		
Unpaid miscellaneous.....	484.30		
			30,186.38
Repayments accrued:			
Building.....	67,290.00		
Operation and maintenance.....	12,532.60		
			79,822.60
Total liabilities.....			1,181,075.52

*Feature costs to June 30, 1909, Umatilla project*

Storage works:			
General expense.....	\$25,496.69		
Storage dam.....	314,457.46		
Buildings.....	11,127.92		
Inlet works.....	11,071.39		
Main spillway.....	28,389.89		
Feed canal, excavation, class 1.....	2,115.29		
Outlet works.....	5,892.09		
			\$398,550.73
Storage feed canal:			
Diversion works and canal.....	226,801.77		
Repairing and priming.....	11,453.54		
Wasteways.....	6,685.81		
Bridges and crossings.....	1,185.19		
Concrete lining and cut-off wall.....	20,457.85		
Buildings.....	1,701.84		
			268,286.00

## Distributing system:

Canals and laterals.....	\$70,287.23	
By-pass, drops, turnouts, and miscellaneous structures.....	24,496.00	
Pipe lines.....	90,167.83	
Crossings and bridges.....	4,193.01	
Priming canals.....	2,905.26	
Subdivision of lands.....	756.94	
Reconstruction and repairs, Maxwell system.....	527.26	
		<hr/>
		\$193,333.53
Demonstration farm: Buildings.....		2,459.91
Real estate (rights and property): Lands purchased.....		17,685.32
Buildings: Construction of, at Hermiston.....		6,361.03
Examination of project as a whole:		
Surveys.....	20,552.00	
Design.....	4,404.00	
		<hr/>
		24,956.00
Administration of project as a whole: General expense.....		60,203.15
West branch of project: West branch canal.....		25,729.32
Inventory of unused supplies.....		13,442.07
		<hr/>
Total building cost.....		1,011,007.06
Operation and maintenance:		
Feed canal and reservoir protection.....	14,810.40	
Distributing laterals.....	16,373.67	
Pipe-line protection.....	85.21	
General expense.....	3,809.08	
		<hr/>
		35,078.36
		<hr/>
Total building and operation and maintenance cost, as per debit in cost of work in statement of assets and liabilities.....		1,046,085.42

## OREGON-CALIFORNIA

### KLAMATH PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

States: Oregon and California.  
Counties: Klamath, Oreg.; Siskiyou and Modoc, Cal.  
Townships: 38 to 41 S., Rs. 8 to 14 E., Willamette meridian; 46 to 48 N., Rs. 1 to 8 E., Mount Diablo meridian.  
Railroad: California Northeastern.  
Railroad stations: Klamath Falls, Midland, and Ady, Oreg.  
Average elevation of irrigable area: 4,100 feet above sea level.  
Average annual rainfall on irrigable area: 15 inches.  
Range of temperature on irrigable area:  $-5^{\circ}$  F. to  $100^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Upper Klamath Lake and Clear Lake.  
Area of drainage basin: 3,700 square miles.  
Average elevation of drainage basin: 4,500 feet above sea level.  
Average annual rainfall on drainage basin: 20 inches.  
Average annual run-off of drainage basin: 1,700,000 acre-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoirs: Upper Klamath Lake—area, 60,000 acres; capacity, 200,000 acre-feet.  
Clear Lake—area, 25,000 acres; capacity, 462,000 acre-feet; length of spillway, 360 feet; elevation of spillway, 24 feet above stream bed.  
Storage dam: Clear Lake—type, rock fill; maximum height, 33 feet; length of crest, 940 feet; contents, 50,000 cubic yards.  
Length of canals now constructed: 10 miles with capacities greater than 300 second-feet; 34 miles with capacities less than 300 and greater than 50 second-feet; 82 miles with capacities less than 50 second-feet.  
Length of tunnel: 3,300 feet.  
Aggregate length of dikes: 4,000 feet, exclusive of marsh reclamation.  
Power development: Not determined.  
Construction of project authorized: May 17, 1905.  
Per cent completed: 38.

#### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 172,000 acres; lower project, 135,000 acres; upper project, 37,000 acres.  
Ownership of irrigable lands (whole project): Public, 42,000 acres; private, 130,000 acres.  
Lands irrigated, season of 1909: Private, 21,000 acres.  
Character of soil of irrigable area: Decomposed basalt and rich alluvial deposits.  
Duty of water: 1.8 acre-feet per acre per annum at the farm.  
Principal products: Alfalfa, hay, grain, and vegetables.  
Principal markets: Portland, Oreg.; Sacramento and San Francisco, Cal.

#### LANDS OPENED FOR IRRIGATION

Dates of public notices: November 18, 1908, and December 7, 1908.  
Location of lands opened: Tps. 38 S., R. 9 E.; 39 S., Rs. 8 to 10 E.; 40 S., Rs. 9 to 11 E.; 41 S., Rs. 10 to 12 E., Willamette meridian; and 48 N., R. 5 E., Mount Diablo meridian.  
Irrigable area opened: 30,916 acres, practically all private.  
Limit of area of farm units: 160 acres.  
Building charge per acre of irrigable area: \$30.  
Annual operation and maintenance charge: \$0.75 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Klamath project may be found in the fifth annual report and general descriptions of the project and of the progress of work thereon are given in other annual reports. The irrigation plan of the lower division of the project provides for a canal diverting water from the east side of the outlet of Upper Klamath Lake for the irrigation of lands in the lower valley of Lost River, Klamath Valley, and the bed of Tule Lake; a canal diverting water from the west side of the outlet of Upper Klamath Lake for power purposes and for the irrigation of lands in the Klamath River valley; and drainage works near Keno, Oreg., for reducing the water level of Lower Klamath Lake. The plan of the upper division of the project provides for a storage dam at the outlet of Clear Lake; a diversion dam on Lost River about 12 miles below the storage dam; and canals on either side of the river for the irrigation of lands in the upper valley of Lost River. Canal systems for the irrigation of about 30,000 acres in the lower division of the project have been completed, the storage dam at Clear Lake is in process of construction, and preliminary work incident to the development of the remainder of the project is in progress.

## SOUTH BRANCH CANAL AND LATERALS

During the fiscal year the excavation of the channel and the construction of the flume for the south branch canal was completed under contracts and the structures therefor were built by force account. The lateral system for this canal, constructed under cooperative contracts and by force account, was also completed during the year.

## CLEAR LAKE DAM

Preparatory work was begun in October 1908, by force account, on the outlet for Clear Lake reservoir. Considerable time has been spent in getting equipment and supplies to the dam site but preparations for effective work have been finished and the dam was 18 per cent completed at the end of the fiscal year. This dam, together with the Olene channel and the outlets at the south end of Tule Lake, will effect the uncovering of a large portion of the bed of Tule Lake.

## TELEPHONE CONSTRUCTION

Fifty miles of metallic circuit telephone line were built during the fiscal year and on June 30, 1909, a total of 64 miles of telephone line had been constructed. The trunk telephone line runs along the Main, South Branch, and Adams canals to the state line, follows the state line to Malone's bridge, and then runs southeast to the Clear Lake dam site.

## EXPERIMENTAL FARMS

Levees inclosing the experimental marsh farm were completed in December, 1908, and drainage pumps installed in February, 1909. About 8,200 feet of drainage ditches have been constructed and the land has been drained. Thirty varieties of vegetables and cereals have been planted in small tracts, evaporation observations are being

made, and it is intended to cooperate with the Department of Agriculture in the future operation of the farm. An 80-acre tract of high land has been leased and will be used for government stock, for raising vegetables for government camps and to illustrate practical methods of irrigation.

#### DRAINAGE INVESTIGATIONS

The drainage basin of the marsh lands has been investigated. The flow of all creeks that discharge into the marsh area, and the discharge of all springs so far as found therein, have been carefully measured. A tentative system of drainage and irrigation has been designed and estimates relating thereto have been prepared. Investigations have been carried on to determine the possibility of draining the waters of Tule Lake into the Modoc lava beds. During the fall of 1908 the opening into the loose lava rocks, which had been made in the spring of the same year and had discharged about 15 second-feet of water, was enlarged and the flow increased to approximately 30 second-feet, which has continued undiminished. The total outflow from the lake at this point up to June 30, 1909, amounts to approximately 15,000 acre-feet. It is planned at an early date to open additional outlets along the southern shore of this lake in order to further increase this discharge.

#### PUMPING FOR IRRIGATION

The question of irrigating about 15,000 acres of land which lie above the gravity canals of the project by means of pumping has been considered. Power for this purpose may be developed from the Klamath River and a drop from the main to the south branch canal.

#### UPPER PROJECT CANALS

A location of two main canals serving the upper valley of Lost River was made in 1908. The east side canal is 50 miles long and will furnish water to irrigate 27,000 acres of land; the west side canal is 30 miles long and will water 10,000 acres.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Klamath project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
87	Feb. 5, 1906	Mason, Davis & Co. ....	Main canal.....	377,330.00	\$417,785.14	July 20, 1907
231	Apr. 2, 1908	Western Building Material Co.	Cement.....	1,000.00	735.90	Oct. 1, 1908
242	May 8, 1908	Maney Brothers & Co. ....	South Branch canal.	78,996.70	\$ 75,783.67	Mar. 16, 1909
271	Feb. 12, 1909	Pacific Portland Cement Co.	Cement.....	19,375.00	310.00	Dec. 31, 1909

• Completed.



## PUBLIC NOTICE DATED NOVEMBER 18, 1908

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the Klamath project, Oregon-California, under the provisions of the reclamation act, in the irrigation season of 1909, for the irrigable land shown on farm units of T. 39 S., R. 8 E.; T. 38 S., R. 9 E.; T. 40 S., R. 9 E.; T. 39 S., R. 10 E.; T. 40 S., R. 10 E.; T. 41 S., R. 10 E.; T. 40 S., R. 11 E.; T. 41 S., R. 11 E.; T. 41 S., R. 12 E., Willamette meridian and T. 48 N., R. 5 E., Mount Diablo meridian, approved November 16, 1908, by the Secretary of the Interior and on file in the local land offices at Lakeview, Oreg., and Redding, Cal.

Homestead entries, accompanied by applications for water rights and the first installment of the building and operation and maintenance charges, may be made under the provisions of said act for the farm units shown on said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown upon the plats for the several farm units.

The limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership which can be irrigated by the waters from the said irrigation project are in two parts as follows:

1. The building of the irrigation system, \$30 per acre of irrigable land, payable in not more than ten annual installments, each payment not less than \$3 per acre or some multiple thereof; provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not. The operation and maintenance charge for the irrigation season of 1909 and until further notice will be 75 cents per acre of irrigable land, whether water is used thereon or not.

For lands hereafter entered the first installment on account of the said charges for the irrigable lands shown on these plats shall be paid for the season of 1909 at the local land office at Lakeview, Oreg., or Redding, Cal., at the time of entry and of filing water-right application, the total payment being not less than \$3.75 per acre. The second installment shall be due and payable May 1, 1910, at the same place. Subsequent installments shall be due and payable on May 1 of each year at the same place.

For lands in private ownership and for lands heretofore entered, the first installment shall be due and payable May 1, 1909, and the installments for the year 1910 and subsequent years shall be due and payable on the same date and at the same place.

The first instalment of the charges for all irrigable areas shown on these plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable as herein provided.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1909 for any lands unless the portion of the installment for operation and maintenance due and payable on or before May 1, 1909, has been paid on or before that date, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before May 1 of that year of the portion of the installment for operation and maintenance which was at that time due and payable.

For all applications for water rights filed after June 15 in 1909 or any subsequent year, one installment of the charges for building, operation, and maintenance, \$3.75 per acre, must be paid at the time of filing, but the portion of the installment for operation and maintenance shall be credited on account of the installment of said charges for the subsequent year.

If any installment of the charges shall not have been paid in full on or before May 1 of the year subsequent to that in which it is due and payable as herein provided, it shall then become delinquent and under the terms of section 5 of the reclamation act the entry and water-right application shall be subject to cancellation with the forfeiture of any moneys paid thereon.

The charges herein provided for may for the convenience of applicants be paid to the special fiscal agent of the United States Reclamation Service assigned to the Klamath project for transmission to the registers and receivers of the local land offices on or before the date specified for payment at the local land offices, but in case this privilege is availed of the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

The notice was forwarded to the General Land Office for transmission to the local land offices at Lakeview, Oreg., and Redding, Cal., with instructions for conforming to the farm units the homestead entries made or to be made under the provisions of the reclamation act; that the local officers give publicity to the notice and announce that water-right applications must be filed in the proper form in the local land office before water will be furnished; that the United States will operate and maintain the storage and diversion works and main canals as shown on a plat of the project approved by the Director of the Reclamation Service, a copy of which is on file with the engineer in charge of the project, the cost thereof to be included in the operation and maintenance charges for the project; that the amount of water to be furnished is 1.8 acre-feet per acre per annum; that the building charge and number of annual installments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence in the neighborhood has been fixed at 30 miles; and that the Secretary of the Interior has entered into a contract with the Klamath Water Users' Association, and the certificate of that association forming part of the water-right application must be filled in before the application can be accepted.

#### PUBLIC NOTICE DATED DECEMBER 7, 1908

Subject to the terms and provisions of the public notice dated November 18, 1908, notice is hereby given, in pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), that water will be furnished under the Klamath project in the irrigation season of 1909 for the lands designated upon farm-unit plat of T. 39 S., R. 9 E., Willamette meridian, approved by the Secretary of the Interior December 1, 1908, and on file in the local land office at Lakeview, Oreg.

The notice was approved and forwarded to the General Land Office for appropriate action, in pursuance of the public notice and accompanying instructions issued November 18, 1908, for other lands under the Klamath project, and with instructions that it be published in local newspapers.

#### SETTLEMENT

The area opened for irrigation lies between Klamath Falls and Merrill, Oreg., and is irrigated by about 35 miles of main canals and 85 miles of main laterals. The lands have been held in large tracts chiefly for stock raising, and it was not until the spring of 1909, when railroad facilities were secured, that settlement became active. The population of the district was estimated at 3,500 in 1908 and at 4,600 on June 30, 1909.

There are 9,200 acres of land, largely in excess holdings, that are not irrigated and are offered for sale.

## AGRICULTURAL DEVELOPMENT

Progress in agricultural development during the past three seasons is shown in the following table:

*Irrigable lands and progress of irrigation, Klamath project*

Year.	Number of water users.	Average size of farms.	Area irrigated.	Area not irrigated.	Total irrigable area.
		<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
1907.....	92	100	9,000	11,000	20,000
1908.....	112	90	9,800	10,200	20,000
1909.....	243	85	20,800	9,200	30,000

Progress is also shown in the wider range of crops raised. Special crops, such as field peas, vetch, rape, root crops, etc., are being grown by various farmers in anticipation of the possibilities of specialized farming and feeding. The following table shows the area planted, yield, and value of crops for the season of 1908:

*Crop results, season 1908, Klamath project*

Planted to—	Area.	Per cent of total irrigated area.	Average yield per acre.	Total value of crop.	Average value per acre.
	<i>Acres.</i>				
Alfalfa.....	4,724	47.9	2.9 tons.....	\$95,242	\$20.30
Timothy.....	106	1.0	2 tons.....	2,060	20.00
Grain hay.....	503	5.1	1.3 tons.....	7,872	15.00
Wild hay.....	250	2.5	1.2 tons.....	2,100	8.40
Barley.....	1,343	13.6	23.4 bushels.....	26,680	19.89
Wheat.....	590	5.9	17.4 bushels.....	9,254	15.66
Oats.....	324	3.3	27.3 bushels.....	4,422	13.70
Potatoes.....	28	.3	76 bushels.....	3,526	115.40
Pasture.....	1,649	16.8	.....	9,894	6.00
Orchard and garden.....	75	.7	.....	750	10.00
Miscellaneous.....	280	2.9	.....	2,800	10.00
Total and mean.....	9,872	100.0	.....	164,600	16.67

The results indicate alfalfa to be the most profitable crop raised, with timothy hay and barley next in order. The year was not favorable, and dry lands in the district produced practically no crop.

The following table shows live stock conditions for the season of 1908 on lands under irrigation on the project:

*Live stock, Klamath project*

Variety.	Number of animals.	Total value.	Average value.	Per cent of total value.
Horses.....	1,991	\$140,714	\$70.70	66.4
Mules.....	156	18,465	118.40	8.7
Cattle.....	2,175	43,576	20.00	20.6
Hogs.....	1,400	6,436	5.30	3.0
Sheep.....	56	168	3.00	.1
Chickens.....	5,385	2,351	.44	1.1
Turkeys.....	133	290	2.18	.1
Total.....	.....	212,000	.....	100.0

The total value of crops and live stock is estimated at \$376,600, an average for each farmer for the season of \$1,470 for crops raised and \$1,890 for live stock owned.

Experiments made by farmers in cooperation with the service on two varieties of sugar beets, three of oats, three of barley, five of alfalfa, seven of grass, and nine of shade and ornamental trees gave uniformly favorable results. Excellent crops of celery were produced on soils adjoining the marsh land.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Klamath project*

ASSETS		
Accounts receivable:		
Uncollected water rentals.....	\$2,371.50	
Uncollected miscellaneous.....	46.32	
Uncollected water-right building charges.....	82,488.00	
Uncollected water-right operation and maintenance charges.....	6,971.95	
		\$91,877.77
Inventories:		
Mercantile store.....	940.71	
Government animals.....	6,710.65	
Equipment in use.....	18,434.14	
Storehouse.....	4,825.73	
Cement.....	1,284.61	
Lumber.....	3,497.19	
Explosives.....	1,508.79	
Forage.....	1,699.41	
Fuel.....	904.21	
Local products.....	386.42	
Unadjusted transfers.....	1,270.74	
Freight and handling undistributed.....	622.14	
		42,084.74
Cost of work:		
Building cost.....	1,655,284.95	
Less adjustments.....	\$953.77	
Less accrued revenues.....	33,347.66	
	34,301.43	
		1,620,963.52
Operation and maintenance cost.....	42,430.35	
Less accrued revenues.....	1,000.00	
		41,430.35
Total assets.....		1,796,356.38
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	\$1,674,578.32	
Transfer vouchers received.....	36,289.37	
	\$1,710,867.69	
Collection vouchers.....	42,173.15	
Transfer vouchers issued.....	9,656.25	
	51,829.40	
		\$1,659,038.29
Accounts payable:		
Unpaid labor.....	8,751.12	
Unpaid purchases.....	4,438.09	
Unpaid contract estimates.....	207.50	
Unpaid freight and express.....	10,369.98	
Unpaid passenger fares.....	372.90	
Unpaid land agreements.....	9,020.00	
		33,159.59
Repayments accrued:		
Building.....	82,653.00	
Operation and maintenance.....	21,505.50	
		104,158.50
Total liabilities.....		1,796,356.38

*Feature costs to June 30, 1909, Klamath project***Canal system:**

Main canal.....	\$524,992.10	
East Branch canal.....	39,410.12	
Keno canal.....	90,414.29	
South Branch canal.....	167,906.65	
South Branch laterals.....	47,205.95	
Poe Valley canals.....	1,824.47	
Poe Valley laterals.....	545.85	
West Side canal, upper project.....	1,368.63	
East Side canal, upper project.....	2,129.45	
		<hr/>
		\$875,797.51

**Storage works:**

Clear Lake dam.....	17,392.65	
Horsefly reservoir.....	106.61	
		<hr/>
		17,499.26

**Drainage:**

Upper project—		
Langell Valley canal.....	180.77	
Lower project—		
Lost River preliminary expense.....	\$5,318.59	
Henley drain.....	405.91	
Tule Lake outlet.....	2,632.88	
		<hr/>
		8,357.38
Lower lake—		
Preliminary expense.....	2,453.84	
		<hr/>
		10,991.99

**Buildings:**

Construction.....	8,430.65	
Camp maintenance.....	4,514.64	
		<hr/>
		12,945.29

**Telephone system: Construction.....**

15,052.89

**Real estate (rights and property): Canals, rights of way, and lands purchased.....**

532,829.63

**Examination of project as a whole:**

Preliminary expense.....	\$46,809.90	
Hydrography.....	12,297.94	
		<hr/>
		59,107.84

**Experimental farm: Buildings, etc.....**

8,009.43

**Administration of project as a whole: General expense.....**

117,824.86

**Rock crushing plant.....**

3,785.62

**Inventory of unused supplies.....**

1,420.63

Total building cost..... 1,655,264.95

**Operation and maintenance:**

General expense.....	7,817.27	
Property.....	78.99	
Earthwork.....	5,601.41	
Structures.....	5,180.46	
Distribution.....	2,118.57	
Protection.....	139.82	
Telephone.....	439.40	
Corral maintenance.....	1,565.64	
Corral operation.....	219.39	
Cement pipe construction.....	186.61	
Expenses prior to July 1, 1908.....	18,767.01	
Gates and fences.....	212.72	
Farms, experimental.....	103.06	
		<hr/>
		42,430.35

Total building and operation and maintenance cost, as per debit

in cost of work in statement of assets and liabilities ..... 1,697,695.30

## **SOUTH DAKOTA**

### **BELLE FOURCHE PROJECT**

#### **LOCATION AND CLIMATIC CONDITIONS**

State: South Dakota.

Counties: Butte and Meade.

Townships: 6 to 10 N., Rs. 3 to 8 E., Black Hills meridian.

Railroads: Chicago and Northwestern; Chicago, Burlington and Quincy; Chicago, Milwaukee and St. Paul.

Railroad stations: Belle Fourche, Sturgis and Whitewood, S. Dak.

Average elevation of irrigable area: 2,800 feet above sea level.

Average annual rainfall on irrigable area: 15 inches.

Range of temperature on irrigable area:  $-20^{\circ}$  F. to  $95^{\circ}$  F.

#### **WATER SUPPLY**

Source of water supply: Belle Fourche River.

Area of drainage basin: 4,300 square miles.

Average elevation of drainage basin: 6,000 feet above sea level.

Average annual rainfall on drainage basin: 28 inches.

Average annual run-off of drainage basin: 400,000 acre-feet.

#### **ENGINEERING DATA FOR COMPLETE PROJECT**

Reservoir: Belle Fourche—area, 8,010 acres; capacity, 203,770 acre-feet; length of spillway, 500 feet; elevation of spillway, 100 feet above stream bed.

Storage dam: Belle Fourche—type, earth fill; maximum height, 115 feet; length of crest, 6,200 feet; contents, 1,600,000 cubic yards.

Diversion dam: Type, concrete weir; maximum height, 23 feet; length of masonry crest, 400 feet.

Length of canals: 55 miles with capacities greater than 300 second-feet; 45 miles with capacities less than 300 and greater than 50 second-feet; 500 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 1,310 feet.

Construction of project authorized May 10, 1904.

Per cent completed: 70.

#### **AGRICULTURAL CONDITIONS**

Irrigable area: Whole project, 100,000 acres.

Ownership of irrigable lands (whole project): Public, 45,000 acres; State, 5,000 acres; private, 50,000 acres.

Lands irrigated season of 1909: Public, 2,252 acres; private, 5,186 acres.

Character of soil of irrigable area: North side, clay loam; south side, sandy loam.

Duty of water: 2 acre-feet per acre per annum at the farm.

Principal products: Grain, alfalfa, potatoes, sugar beets, garden truck, small fruit.

Principal markets: Omaha, Nebr.; Chicago, Ill.; Minneapolis and St. Paul, Minn.; and mining towns in the Black Hills.

#### **LANDS OPENED FOR IRRIGATION**

Dates of public notices and orders relating thereto: June 21, 1907; May 29, 1908; January 18, 1909.

Location of lands opened: Tps. 8 and 9 N., Rs. 3 to 6 E., Black Hills meridian.

Irrigable area opened: Public, 3,765 acres; State, 577 acres; private, 7,581 acres.

Limit of area of farm units: 160 acres.

Building charge per acre of irrigable land: \$30.

Annual operation and maintenance charge: \$0.40 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Belle Fourche project may be found in the fourth and fifth annual reports and general descriptions of the project and of the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for a diversion dam on Belle Fourche River about 2 miles below Belle Fourche, S. Dak.; a storage reservoir controlled by Belle Fourche dam on Owl Creek, a small tributary of Belle Fourche River; a short inlet canal connecting the diversion works with the storage reservoir and furnishing water to lands between these features; a north outlet canal taking water from the reservoir for the irrigation of lands on the north side of Belle Fourche River, and a south outlet canal supplying water directly to lands on the north side of Belle Fourche River and through an inverted siphon across the river to lands on the south side. The diversion dam, the inlet canal, the inverted siphon, and portions of the outlet canals are completed. Belle Fourche dam and extensions of the outlet canals are under construction.

## BELLE FOURCHE DAM

Work on Belle Fourche dam has been carried on under contract with good progress, and the completion of the contract, which also included about 15 miles of canal, has been advanced from 37 per cent to 68 per cent during the fiscal year.

The dam is now built to a height of 90 feet above the stream bed except across the channel of Owl Creek, where a gap was left to discharge possible floods. The work of closing the gap has been started and by winter will be completed.

The work on the wasteway is well advanced and as soon as the gap at Owl Creek is closed water can be stored in the reservoir to an available depth of 20 feet or a total depth of 50 feet.

## NORTH AND SOUTH CANAL SYSTEMS

The Belle Fourche tunnel and the siphons across Belle Fourche River, Anderson Draw, and Whitewood Creek on the South canal were completed during the fiscal year. The first section of the North canal has been finished and the South canal has been completed to Cottonwood Creek. The work remaining to be done on the South canal, which comprises the building of some small structures, will be finished in the near future.

The distribution canals for the lands west of Horse Creek and on the south side, small ditches ranging from 2 to 10 feet bottom width, have all been excavated and the numerous structures, including turnouts, culverts, bridges, division boxes, weirs and drops, are being installed.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Belle Fourche project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
36	Apr. 24, 1905	S. R. H. Robinson..	Diversion dam and structures.	\$99,936.50	\$130,255.64	Sept. 16, 1907
90	Feb. 20, 1906	Western Portland Cement Co.	Cement.....	72,900.00	α 63,429.81	Jan. 1, 1908
192	July 8, 1907	Walter S. Dickey....	Vitrified pipe.....	6,851.73	α 6,758.76	Mar. 1, 1908
227	Mar. 20, 1908	Western Portland Cement Co.	Cement.....	26,160.00	13,468.04	Oct. 1, 1908
232	Apr. 8, 1908	J. E. Hilton.....	South canal, sections 4a, 4b, and 4c.	28,201.50	α 24,318.65	Mar. 1, 1909
234	.....do.....	National Surety Co..	Dam and canals.....	693,187.34	290,487.82	Dec. 1, 1910
236	May 14, 1908	J. W. McNeel.....	South canal, section 2b.	9,880.00	α 10,056.46	Mar. 1, 1909
238	May 18, 1908	Leonard Seitz.....	South canal, section 2a.	8,052.00	α 8,760.42	Apr. 30, 1909
245	July 11, 1908	Cole Bros.....	Lateral system, section 6.	4,305.00	α 4,711.05	Apr. 17, 1909
246	July 18, 1908	L. W. Dotson.....	Lateral system, section 5A.	2,655.00	α 2,413.35	Jan. 29, 1909
255	Oct. 2, 1908	McNeel & Chambers.	Lateral system, section 1.	5,716.00	α 5,902.62	May 28, 1909
256	Sept. 26, 1908	J. E. Hilton.....	Lateral system, sections 12 and 13.	17,843.00	α 14,159.86	July 1, 1909
275	Feb. 19, 1909	Western Portland Cement Co.	Cement.....	26,160.00	10,115.20	
278	Mar. 10, 1909	Walter S. Dickey....	Clay pipe.....	642.50	α 717.50	May 1, 1909
280	Mar. 9, 1909	Coffin Valve Co.....	Steel head-gates.....	741.00	α 741.00	Do.
283	Mar. 2, 1909	Greeley Headgate Co.	Lateral head-gates.....	2,431.20	α 2,431.20	May 10, 1909
286	Apr. 13, 1909	J. E. Hilton.....	Lateral system, sections 2, 3, and 4.	10,111.00	9,087.86	Aug. 20, 1909

α Completed.

## PUBLIC NOTICE DATED JANUARY 18, 1909

On June 21, 1907, public notice was issued in pursuance of the act of Congress approved June 17, 1902 (32 Stat. L., 388), in connection with the Belle Fourche project, South Dakota, announcing that water would be furnished in the irrigation season of 1908 for the irrigable lands shown upon the farm-unit plats of Tps. 8 and 9 N., Rs. 3, 4, and 5 E., Black Hills meridian.

All persons who have made homestead entries of any of such lands subject to the reclamation act and who have not filed water-right applications therefor are hereby notified that such lands are subject to the charges announced in the public notice, whether or not water-right application is made therefor or water is used thereon, and that no water will be furnished unless application has been duly filed, and the portions of the installments on account of operation and maintenance have been paid in accordance with the public notices and orders issued.

All entries made after the date hereof for the lands shown on said plats must be accompanied by water-right applications, and payment must be made at the time of entry of the first installment on account of the charges for building, operation, and maintenance, \$3.40 per acre of irrigable land. The second installment shall become due on December 1 of the year following that in which entry was made, and subsequent installments on December 1 of each year thereafter.

The public notice of June 21, 1907, announces that the charges for the building of the irrigation system are payable in not less than five nor more than ten annual installments. This provision is hereby modified so that the said charges shall be payable in not more than 10 annual installments; provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.



For all applications for water rights filed after June 15 in any year, that portion of the installment paid at the time of entry which is for operation and maintenance shall be credited on account of the portion of the installment for operation and maintenance for the subsequent year.

The charges may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the Belle Fourche project, for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office, but in case this privilege is availed of, the necessary charges for transportation of the cash as determined by the special fiscal agent must accompany the payment of the water-right charges.

The notice was forwarded to the General Land Office with instructions that appropriate action be taken for putting the provisions thereof into effect, and for its publication in local newspapers.

#### OPERATION AND MAINTENANCE

During the fiscal year 48½ miles of canals and laterals have been operated for the irrigation of about 12,000 acres of land. Several slides occurred on the new canals and seepage has appeared at a number of places. A system of division boxes on laterals has been installed where possible to facilitate the division of water and the work of operation. The cost of operation and maintenance was about 50 cents per acre of irrigable land under the system operated.

#### SETTLEMENT AND DEVELOPMENT

Practically all of the government land for which canals are being operated has been entered, but much of the land is not in cultivation. Most owners of private lands are making use of the water furnished, with good results. The State has made no attempt to dispose of the school lands.

The following table shows the status of the lands which have been opened for irrigation:

*Status of land opened for irrigation, Belle Fourche project*

	All farms.			Farms irrigated.		
	Number.	Total area.	Irrigable area.	Number.	Total area.	Irrigable area.
		<i>Acres.</i>	<i>Acres.</i>		<i>Acres.</i>	<i>Acres.</i>
Private land.....	65	11,080	8,158	50	7,600	5,186
Public land.....	51	6,220	2,812	27	3,543	1,569
Title pending at opening of project.....	16	1,640	953	9	1,120	683
Total.....	132	18,940	11,923	86	12,263	7,438

The following table shows the area, yield, and value for various crops in the season of 1908:

*Crop results, Belle Fourche project*

Crops.	Area.	Average yield per acre.	Value per acre.	Total value.
	<i>Acres.</i>			
Oats.....	2,080	42 bushels.....	\$21.00	\$43,680
Corn.....	800	16 bushels.....	9.60	7,680
Wheat.....	600	20 bushels.....	18.00	10,800
Native hay.....	320	1 ton.....	9.00	2,880
Potatoes.....	80	90 bushels.....	54.00	4,320
Alfalfa.....	40	44 tons.....	18.00	7,720
Barley.....	40	25 bushels.....	13.75	550
Rye.....	40	15 bushels.....	10.50	420
Garden truck.....	10		100.00	1,000
Total and mean.....	4,010		17.97	72,050

Except for about 100 acres the above results were secured from sod land that had never been in crop before.

FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Belle Fourche project*

ASSETS

Accounts receivable:				
Uncollected miscellaneous.....			\$2,757.44	
Uncollected water-right building charges.....			21,701.49	
Uncollected water-right operation and maintenance charges.....			579.20	
				\$25,038.13
Inventories:				
Mercantile store.....			250.94	
Government animals.....		\$17,077.03		
Less depreciation.....		8,130.65		
				8,946.38
Equipment in use.....		20,858.40		
Less depreciation.....		6,427.74		
				14,430.66
Storehouse.....			4,165.71	
Cement.....			15,645.38	
Iron and steel.....			64.00	
Lumber.....			8,445.09	
Explosives.....			13.85	
Forage.....			1,674.34	
Fuel.....			59.01	
Cash in office safe.....			38.25	
Local products.....			12,517.57	
Unadjusted transfers.....			1,486.29	
				67,737.47
Cost of work:				
Building cost.....	1,960,638.42			
Plus adjustments.....	121.69			
			1,960,760.11	
Less accrued revenues.....			8,640.96	
				1,952,119.15
Operation and maintenance cost.....			11,185.85	
Less accrued revenues.....			15.20	
				11,170.65
Total assets.....				2,056,065.40

LIABILITIES

Investment of the United States:				
Disbursement vouchers.....	\$1,905,752.24			
Transfer vouchers received.....	43,078.08			
			\$1,948,830.32	
Collection vouchers.....	18,860.85			
Transfer vouchers issued.....	11,752.97			
			30,613.82	
				\$1,918,216.50

<b>Accounts payable:</b>		
Unpaid labor.....	\$5,920.90	
Unpaid purchases.....	10,277.82	
Unpaid contract estimates.....	45,112.85	
Unpaid contract holdbacks.....	45,908.78	
Unpaid freight and express.....	1,373.40	
Unpaid passenger fares.....	4.00	
Unpaid land agreements.....	987.40	
		<b>\$109,585.15</b>
<b>Repayments accrued:</b>		
Building.....	22,313.49	
Operation and maintenance.....	5,950.26	
		<b>28,263.75</b>
<b>Total liabilities.....</b>		<b>2,056,065.40</b>

*Feature costs to June 30, 1909, Belle Fourche project*

<b>Diversion dam and structures: Completed cost.....</b>		<b>\$117,062.75</b>
<b>Supply canal and structures:</b>		
Earthwork.....	\$242,898.19	
Crow Creek sluice.....	60,581.98	
Drop at reservoir.....	4,739.54	
Highway bridges.....	10,233.05	
Concrete culverts.....	2,777.04	
Check gates.....	3,413.45	
Bridge abutments.....	1,636.21	
Flood expense.....	2,969.37	
		<b>329,248.83</b>
<b>Storage works:</b>		
Belle Fourche dam and appurtenances—		
Orman & Crook.....	273,423.40	
National Surety Company.....	328,190.43	
Belle Fourche reservoir.....	437.17	
		<b>602,051.00</b>
<b>North canal:</b>		
Division A, Orman & Crook.....	109,843.05	
Division A, National Surety Company.....	254.60	
Minor structures, bridge 1.....	274.25	
Division B, survey and design.....	3,749.59	
Division C, survey and design.....	4,920.66	
		<b>119,042.15</b>
<b>South canal:</b>		
Division A, Orman & Crook.....	77,847.04	
Division B—		
Earthwork, class A.....	21,089.38	
Earthwork, class B.....	5,323.08	
Earthwork, section 2A and 2B.....	22,303.78	
Belle Fourche siphon.....	58,838.48	
Stinking Water, culvert 2.....	7,562.59	
Tunnel portals, earthwork.....	21,372.39	
Belle Fourche tunnel.....	34,107.54	
Anderson Draw siphon.....	13,095.98	
Reinforced lined canal.....	16,676.16	
Excavation for South canal structures.....	5,977.13	
Concreting, South canal structures.....	10,991.87	
Timbering, South canal structures.....	1,771.33	
Division C—		
Section 4, earthwork.....	29,183.03	
Sections 5 and 6, earthwork.....	47,499.45	
Sections 7 and 8, earthwork.....	44,549.93	
Whitewood siphon.....	18,894.76	
Feeder canal to South canal, earthwork.....	2,863.72	
Flood expense, Whitewood siphon.....	544.82	
Vitrified pipe structures.....	110.09	
		<b>440,602.55</b>
<b>Laterals, division A:</b>		
Excavation, contract work.....	137,616.09	
Structures, force account work.....	74,279.62	
		<b>211,895.71</b>

Laterals, division B: Survey and design.....		\$2,952.06
Laterals, division C:		
Excavation, contract work.....	\$22,635.61	
Structures, force account work.....	5,149.50	
		27,785.11
Telephone system:		
Construction.....	9,223.51	
Maintenance.....	155.45	
		9,378.96
Real estate (rights and property): Lands purchased.....		49,160.60
Irrigable lands: Farm-unit subdivision, and soil examination .....		16,481.31
Buildings:		
Belle Fourche warehouse.....	1,483.34	
Buildings at diversion dam.....	4,327.53	
Buildings at reservoir.....	11,567.35	
Portable houses.....	1,210.98	
Inspector's residence, gravel pit.....	144.42	
Lateral tents.....	234.57	
Buildings and tents, siphon.....	454.07	
Buildings at tunnel.....	562.53	
Whitewood siphon, plant and buildings, tents.....	2,411.32	
Buildings at Vale.....	1,575.56	
		23,971.67
Experiment farm: Farm building.....		4,023.45
Reconnaissance: Examination.....		1,009.64
Cheyenne River project: Examination.....		245.89
Little Missouri River project: Examination.....		1,247.41
Plant account: Operating expenses undistributed.....		2,674.21
Flood expense, 1909, miscellaneous.....		909.62
Inventory of unused supplies.....		895.48
Total building cost.....		1,960,638.42
Operation and maintenance:		
Main canal.....	3,661.96	
South canal.....	1,806.03	
North canal.....	269.00	
Laterals.....	5,448.26	
		11,185.85
Total building and operation and maintenance cost, as per debit in cost of work in statement of assets and liabilities.....		1,971,824.27

## UTAH

### STRAWBERRY VALLEY PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: Utah.  
Counties: Utah and Wasatch.  
Townships: 8 and 9 S., Rs. 1 to 3 E., Salt Lake meridian.  
Railroads: Denver and Rio Grande; San Pedro, Los Angeles and Salt Lake.  
Railroad stations: Spanish Fork, Payson, and Salem, Utah.  
Average elevation of irrigable area: 4,600 feet above sea level.  
Average annual rainfall on irrigable area: 18 inches.  
Range of temperature on irrigable area:  $-10^{\circ}$  F. to  $95^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Strawberry and Spanish Fork rivers.  
Area of drainage basin: 200 square miles.  
Average elevation of drainage basin: 7,500 feet above sea level.  
Average annual rainfall on drainage basin: 45 inches.  
Average annual run-off of drainage basin: 125,000 acre-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Strawberry Valley—area, 6,800 acres; capacity, 110,000 acre-feet; length of spillway, 100 feet; elevation of spillway, 45 feet above stream bed.  
Storage dam: Strawberry—type, rock fill with concrete core wall; maximum height, 50 feet; length of crest, 325 feet; contents, 60,000 cubic yards.  
Diversion dam: Spanish Fork—type, reenforced concrete weir; maximum height, 16 feet; length of masonry, 70 feet; length of earth fill, 25 feet.  
Length of canals: 3 miles with capacities greater than 300 second-feet; 40 miles with capacities less than 300 and greater than 50 second-feet; 20 miles with capacities less than 50 second-feet.  
Aggregate length of tunnels: 20,500 feet.  
Aggregate length of dikes: 500 feet.  
Water power: Estimated total, 3,000 horsepower.  
Construction of project authorized: December 15, 1907.  
Per cent completed: 33½.

#### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 60,000 acres.  
Ownership of irrigable lands (whole project): Private, 60,000 acres.  
Character of soil of irrigable area: Sandy loam and gravel and black alluvium.  
Principal products: Alfalfa, hay, cereals, sugar beets, fruits, and vegetables.  
Principal markets: Salt Lake City, Utah, and adjacent mining districts.

#### GENERAL STATEMENT

A detailed description of the Strawberry Valley project may be found in the sixth annual report and general descriptions relating to the project are given in other annual reports. Briefly, the irrigation plan of this project provides for a storage reservoir on Strawberry River; a tunnel connecting the reservoir with Diamond Fork, a tributary of Spanish Fork River; a dam diverting water from Spanish Fork River into two canals, one on either side of the river, for the irrigation of land in the valley east of Utah Lake; a hydro-electric plant on the south side canal about 3 miles below the diver-

sion dam; and the enlargement of existing canal systems diverting water from Spanish Fork River. The diversion dam, the power canal, and the first unit of the power plant have been completed, Strawberry tunnel is being excavated, and preliminary work on other features is in progress.

#### STRAWBERRY TUNNEL

Construction work on Strawberry tunnel is being conducted from the west portal with three shifts, work having been resumed there on October 1, 1908, on the completion of the power canal. The total length of the tunnel is 19,000 feet, 3,376 feet of which had been excavated on June 30, 1909. The principal material encountered in the heading has been a limestone containing occasional strata of soft water-bearing sandstone, but several hundred feet of shale which required careful timbering have also been encountered. The power used in construction work in and around the tunnel is generated in the power plant and transmitted  $26\frac{1}{2}$  miles to the substation at the tunnel. The greater part of the machinery has been installed at the west portal substation, and all the tramming and hoisting is being done with electric motors. The road from Diamond switch to the tunnel has been put in good condition and the materials and supplies necessary for the coming winter's work are being hauled in and stored.

#### DIVERSION DAM, POWER CANAL, AND POWER PLANT

The Spanish Fork diversion dam, 3 miles of the power canal with capacity of 500 cubic feet per second, the first unit of the hydro-electric power plant, and the high-tension power transmission line,  $26\frac{1}{2}$  miles long, have all been completed during the fiscal year. There are 1,500 feet of tunnel, 750 feet of covered aqueduct, and 8,000 feet of the canal section concrete-lined on the power canal. The construction of this feature required the excavation of 217,000 cubic yards of earth, 28,000 cubic yards of rock, and the placing of 10,500 cubic yards of concrete. The power house contains two 450-kilowatt generators, and two 600-horsepower turbine water wheels, and the necessary exciters, switchboards, and accessories. Water was turned into the power canal December 13, 1908, and the canal and power plant have been operated practically without interruption since that date.

At the power-house site several brick dwellings have been constructed, a water supply has been developed, and much improvement work, such as fencing, grading, and the construction of several small bridges, has been done.

#### HIGH-LINE CANAL

The final location and cross-section work on the high-line canal has been completed. The canal will be 10 miles long and its construction will involve the excavation of 600,000 cubic yards of rock and earth and the placing of 5,000 cubic yards of concrete.

#### TOPOGRAPHIC SURVEYS

The topographic survey of the lands in the project was completed during the latter part of 1908.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Strawberry Valley project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1909.	Completion due.
163	Apr. 8, 1907	General Electric Co.	Electrical machinery	\$23,282.00	\$26,068.05	Oct. 16, 1907
166	May 15, 1907	Dayton Globe Ironworks Co.	Water-wheel apparatus.	12,261.00	\$ 9,964.52	Sept. 17, 1907
228	Mar. 23, 1908	Henry Gardner.....	Power-transmission line.	4,156.00	\$ 3,834.82	Aug. 15, 1908
229	Mar. 24, 1908	Union Ironworks.....	Steel pressure pipe..	2,410.00	\$ 5,127.17	June 13, 1908
252	Sept. 5, 1908	J. W. G. Stebbins.....	Brick houses.....	3,525.00	\$ 3,654.68	Jan. 10, 1909
266	Nov. 1, 1908	Utah Mining Machinery and Supply Co.	Air compressor.....	1,443.25	\$ 1,443.25	Jan. 12, 1909
284	Apr. 21, 1909	General Electric Co.	Electric locomotives.	2,700.00	1,350.00	June 6, 1909

a Completed.

## DEVELOPMENT

The land on the project is all in private ownership, but because of limited water supply only a small portion of the available land has been irrigated. Since the commencement of work by the Reclamation Service the price of land has increased and young fruit trees have been set out over a large area.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Strawberry Valley project*

## ASSETS

<b>Inventories:</b>			
Mercantile store.....		\$1,820.21	
Government animals.....	\$2,158.75		
Less depreciation.....	348.75		
		1,810.00	
Equipment in use.....	24,810.95		
Less depreciation.....	14,265.85		
		10,545.10	
Storehouse.....		29,832.20	
Lumber.....		1,100.22	
Cash in office safe.....		91.00	
Unadjusted transfers.....		575.93	
Freight and handling, undistributed.....		287.40	
		\$46,091.06	
<b>Cost of work:</b>			
Building cost.....	\$713,915.66		
Plus adjustments.....	554.68		
		714,470.34	
Less accrued revenues.....		14,281.26	
		700,189.08	
Total assets.....		746,280.14	

## LIABILITIES

<b>Investment of the United States:</b>			
Disbursement vouchers.....	\$745,241.26		
Transfer vouchers received.....	18,644.68		
		\$763,885.94	
Collection vouchers.....	35,976.78		
Transfer vouchers issued.....	6,410.86		
		42,387.64	
		\$721,498.30	
<b>Accounts payable:</b>			
Unpaid labor.....		9,203.54	
Unpaid purchases.....		9,988.71	
Unpaid contract hold-backs.....		707.17	
Unpaid freight and express.....		4,781.22	
Unpaid passenger fares.....		87.35	
Unredeemed coupon books.....		13.85	
		24,781.84	
Total liabilities.....		746,280.14	

*Feature costs to June 30, 1909, Strawberry Valley project*

Storage works: Storage reservoir.....		\$149. 92
Strawberry tunnel:		
Heading No. 2.....	\$157, 526. 08	
Tunnel surveys, alignments, and levels.....	202. 00	
Surveys, reconnaissance.....	54. 83	
Heading No. 2, tramway and concrete plant, equip- ment and installation.....	112. 90	
		157, 895. 81
Tunnel plant:		
Power-house tunnel.....	2, 447. 91	
Electric power-house construction.....	4, 845. 55	
Hauling and storing machinery.....	14, 158. 95	
		21, 452. 41
Power canal:		
Excavation, classes 1, 2, 3, and 4.....	136, 028. 18	
Driving and lining, tunnels Nos. 1 and 2.....	49, 458. 45	
Lining canal, re-sloping and cleaning.....	48, 668. 62	
Structures (aqueduct, culvert, station 139-03, waste- way and sand box), excavation and concrete.....	40, 629. 74	
Spanish Fork reservoir.....	4, 492. 68	
Spanish Fork diversion dam.....	39, 695. 90	
Spanish Fork River improvement.....	447. 05	
Bridge over wasteway.....	74. 66	
Bridge over tailrace.....	98. 99	
Bridge 2a.....	133. 76	
Bridge 3b.....	115. 40	
Power canal improvements.....	1, 990. 66	
Upper bridge over wasteway.....	339. 96	
Sidewalks and footbridges.....	128. 48	
		322, 302. 53
Hydro-electric power plant:		
Excavation for building, concrete foundation, con- struction of buildings, and machinery installation....	47, 184. 56	
Penstock construction.....	8, 241. 13	
Transmission line.....	24, 277. 98	
		79, 703. 67
High-line canal:		
Earth and rock work.....	6, 998. 07	
Head gates and diversion.....	416. 47	
		7, 414. 54
Wagon roads:		
Diamond Fork, construction.....	36, 013. 65	
Diamond Fork, maintenance.....	9, 332. 19	
		45, 345. 84
Telephone system:		
Construction.....	13, 643. 04	
Maintenance.....	2, 300. 10	
		15, 943. 14
Real estate (rights and property), land purchased.....		6, 119. 10
Buildings:		
Camp Quinton, construction.....	28, 719. 68	
Diamond switch camp, construction.....	4, 903. 26	
Power-house camp, construction.....	8, 639. 10	
Hammock Grove building, construction.....	919. 20	
		43, 181. 24
Irrigable lands: Topographic surveys.....		4, 109. 27
Examination of project as a whole: Hydrography.....		2, 359. 39
Administration of project as a whole: General expense.....		3, 218. 87
Inventory of unused supplies.....		4, 719. 93
Total building cost, as per debit in cost of work in statement of assets and liabilities.....		713, 915. 66



## WASHINGTON

### OKANOGAN PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: Washington.  
County: Okanogan.  
Townships: 32 to 34 N., R. 25 to 27 E., Willamette meridian.  
Railroad: Great Northern.  
Railroad station: Oroville, Wash., 50 miles from project.  
Average elevation of irrigable area: 1,000 feet above sea level.  
Average annual rainfall on irrigable area: 8 inches.  
Range of temperature on irrigable area:  $-10^{\circ}$  F. to  $105^{\circ}$  F.

#### WATER SUPPLY

Source of water supply: Salmon Creek.  
Area of drainage basin: 150 square miles.  
Average elevation of drainage basin: 4,500 feet above sea level.  
Average annual rainfall on drainage basin: 17 inches.  
Average annual run-off of drainage basin: 30,000 acre-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoirs: Salmon Lake—area, 200 acres; capacity, 2,000 acre-feet. Conconully—area, 640 acres; capacity, 13,000 acre-feet; length of spillway, 180 feet; elevation of spillway, 56 feet above stream bed.

Storage dam: Conconully—type, earthfill; maximum height, 60 feet; length of crest, 1,000 feet; contents, 342,000 cubic yards.

Diversion dam: Salmon Creek—type, concrete weir; maximum height, 4 feet; length of masonry, 50 feet; length of earthfill, 80 feet.

Length of canals now constructed: None with capacities greater than 300 second-feet; 12 miles with capacities less than 300 and greater than 50 second-feet; 29 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 395 feet.

Construction of project authorized: December 2, 1905.

Per cent completed: Entire project, 92; first unit, 100.

#### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 10,000 acres; first unit, 2,122 acres.

Ownership of irrigable lands (whole project): Public, 1,850 acres; private, 8,150 acres.

Lands irrigated season of 1909: Public, 202 acres; private, 4,370 acres.

Character of soil of irrigable area: Volcanic ash, sand, gravel.

Duty of water:  $2\frac{1}{2}$  acre-feet per acre per annum at the farm.

Principal products: Fruit, hay, grain, and vegetables.

Principal markets: Local.

#### LANDS OPENED FOR IRRIGATION

Date of public notice: November 12, 1908.

Location of lands opened: Tps. 33 and 34 N., R. 26 E., Willamette meridian.

Irrigable area opened: Public, 202 acres; private, 1,920 acres.

Limit of area of farm units: Public, 40 acres; private, 40 acres.

Building charge per acre of irrigable land: \$65.

Annual operation and maintenance charge: \$1.50 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Okanogan project may be found in the fifth annual report, and general descriptions of the project and of the progress of work thereon are given in the second, third, fourth, sixth, and seventh annual reports.

Briefly, the irrigation plan of this project involves the construction of a short inlet canal from Salmon Creek into Salmon Lake reservoir; outlet works for the reservoir; a storage reservoir controlled by Conconully dam on Salmon Creek about 2 miles below Conconully, Wash.; a diversion dam on the same stream about 12 miles below the storage dam; a canal heading at this diversion dam, and a system of distributing canals watering lands in the valley of Okanogan River lying on the left side of Salmon Creek between Riverside and Okanogan, Wash. The construction of all these works is completed, except Conconully dam, the construction of which is in progress.

## CONCONULLY DAM

The construction of the embankment for the Conconully dam by the hydraulic-fill process has been continued during the fiscal year and, on June 30, 1909, the embankment contained 212,245 cubic yards of material, which is 61 per cent of the amount required.

## CANALS AND DISTRIBUTING SYSTEM

The construction of the diverting and distributing systems is completed except for the placing of measuring devices at the lateral turnouts, and this work has been completed in the first unit and is in progress on the remainder of the project.

## PRINCIPAL CURRENT CONTRACT

The following statement contains data relating to the principal contract in operation during the fiscal year ending June 30, 1909:

No. 94; date, June 12, 1906; contractor, Pacific Portland Cement Company; for cement; estimated value, \$4,200; estimated earnings, June 30, 1909, \$4,458; completion due July 1, 1907.

## PUBLIC NOTICE DATED NOVEMBER 12, 1908

In pursuance of the provision of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the Okanogan project, Washington, under the provisions of the reclamation act, in the irrigation season of 1909, for the irrigable land shown on farm-unit plats of T. 33 N., R. 26 E., and T. 34 N., R. 26 E., Willamette meridian, approved November 11, 1908, by the Secretary of the Interior and on file in the local land office at Waterville, Wash.

Homestead entries, accompanied by applications for water rights and the first installment of the building and operation and maintenance charges, may be made under the provisions of said act for the farm units shown on said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

The limit of area per entry, representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown upon the plats for the several farm units.

The limit of area for which water-right application may be made for lands in private ownership shall be 40 acres of irrigable land for each landowner.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership which can be irrigated by the waters from the said irrigation project are in two parts, as follows:

1. The building of the irrigation system, \$65 per acre of irrigable land, payable in not more than ten annual installments, each payment not less than \$6.50 per acre or some multiple thereof, provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land, whether water is used thereon or not. The operation and maintenance charges for the irrigation season of 1909 and until further notice will be \$1.50 per acre of irrigable land, whether water is used thereon or not.

Agreements have heretofore been made that certain lands possessing prior vested water rights sufficient for the partial irrigation thereof shall be entitled to certain credits. A list of such lands, showing the amount of credit accruing per acre of irrigable land in the subdivisions affected, will be filed in the local land office, and proper adjustment will be made upon presentation and acceptance of water-right applications.

For lands hereafter entered the first installment on account of the said charges for the irrigable lands shown on these plats shall be paid for the season of 1909, at the local land office at Waterville, Wash., at the time of entry and of filing water-right application, the total payment being not less than \$8 per acre. The second installment shall be due and payable May 1, 1910, at the same place. Subsequent installments shall be due and payable on May 1 of each year at the same place.

For lands in private ownership and for lands heretofore entered the first installment shall be due and payable May 1, 1909, and the installments for the year 1910 and subsequent years shall be due and payable on the same date and at the same place.

The first installment of the charges for all irrigable areas shown on these plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable as herein provided.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1909 for any lands unless the portion of the installment for operation and maintenance due and payable on or before May 1, 1909, has been paid, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before May 1 of that year of the portion of the installment for operation and maintenance at that time due and payable.

For all applications for water rights filed after June 15, in 1909 or any subsequent year, one installment of the charge for building, operation, and maintenance, \$8 per acre, must be paid at the time of filing, but the portion of the installment for operation and maintenance shall be credited on account of the installment of said charges for the subsequent year.

If any installment of the charges shall not have been paid in full on or before May 1 of the year subsequent to that in which it is due and payable as herein provided, it shall then become delinquent and under the terms of section 5 of the reclamation act the entry and water-right application shall be subject to cancellation, with the forfeiture of any moneys paid thereon.

The charges herein provided for may for the convenience of applicants be paid to the special fiscal agent of the United States Reclamation Service assigned to the Okanogan project for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office, but in case this privilege is availed of the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

The notice was forwarded to the General Land Office for transmission to the register and receiver of the local land office at Waterville, Wash., with instructions for conforming to the farm units the homestead entries made or to be made under the provisions of the reclamation act; that the local officers give publicity to the notice and announce that water-right applications must be filed in the proper form in the local land office before water will be furnished; that the United States will operate and maintain the storage and diversion works and main canals as shown on a plat of the project approved by the Director of the Reclamation Service, a copy of which is on file

with the engineer in charge of the project, the cost thereof to be included in the operation and maintenance charges for the project; that the amount of water to be furnished is 2.5 acre-feet per acre per annum; that the building charge and number of annual installments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence in the neighborhood has been fixed at 20 miles; and that the Secretary of the Interior has entered into a contract with the Okanogan Water Users' Association, and the certificate of that association forming part of the water-right application must be filled in before the application can be accepted.

## OPERATION AND MAINTENANCE

The first delivery of water to lands under the project was made in 1908 during the flood stage of the river. On November 12, 1908, the Secretary announced the opening of 2,122 acres for the season of 1909, and these lands are now being served with a full supply of water. In addition to these lands, 1,100 acres have been served with flood waters and 1,350 acres having old water rights will receive a full supply during the season of 1909. In the first unit 70 per cent of the lands have been planted, principally as orchards, which by making vigorous and healthy growth indicate that the lands of the project are well adapted to fruit culture. On June 30 there were 2,000 acre-feet of water stored in Conconully reservoir and 1,700 acre-feet in Salmon Lake reservoir.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Okanogan project*

ASSETS		
Accounts receivable:		
Uncollected water-right building charges.....	\$13,455.00	
Uncollected water-right operation and maintenance charges.....	153.00	
		\$13,608.00
Inventories:		
Government animals.....	480.00	
Equipment in use.....	7,163.67	
Cement.....	1,300.14	
Lumber.....	336.95	
Fuel.....	75.00	
Unadjusted transfers.....	298.25	
Freight and handling, undistributed.....	387.92	
		10,041.93
Cost of work:		
Building cost.....	475,425.00	
Less adjustments.....	\$121.62	
Less accrued revenues.....	2,370.50	
	2,492.12	
		472,932.97
Operation and maintenance cost.....	4,071.10	
Less accrued revenues.....	1,000.50	
		2,470.60
Total assets.....		499,053.50
LIABILITIES		
Investment of the United States:		
Disbursement vouchers.....	\$468,162.16	
Transfer vouchers received.....	11,092.31	
	\$479,254.47	
Collection vouchers.....	8,116.68	
Transfer vouchers issued.....	3,102.26	
	11,218.94	
Accounts payable:		\$468,035.53
Unpaid labor.....	5,471.24	
Unpaid purchases.....	5,996.14	
Unpaid freight and express.....	1,992.73	
Unpaid passenger fares.....	404.66	
Unpaid land agreements.....	70.00	
Unpaid miscellaneous.....	115.00	
		14,049.77
Repayments accrued:		
Building.....	13,785.20	
Operation and maintenance.....	3,183.00	
		16,968.20
Total liabilities.....		499,053.50

*Feature costs to June 30, 1909, Okanogan project*

<b>Salmon Lake reservoir:</b>		
Inlet canal.....	\$1, 619. 25	
Outlet works.....	1, 417. 46	
		<b>\$3, 036. 71</b>
<b>Conconully reservoir:</b>		
Real estate.....	27, 779. 57	
Clearing reservoir site.....	6, 776. 84	
Conconully dam.....	108, 496. 15	
Spillway.....	30, 543. 12	
Outlet works.....	17, 600. 84	
		<b>191, 196. 52</b>
<b>Diversion system:</b>		
Diversion weir.....	3, 517. 07	
Main canal, main lateral and sublaterals.....	170, 785. 69	
		<b>174, 302. 76</b>
<b>Roads and highways: Roads to dam site.....</b>		<b>903. 50</b>
<b>Buildings:</b>		
Construction.....	3, 440. 31	
Maintenance.....	3, 879. 86	
		<b>7, 320. 17</b>
<b>Telephone system:</b>		
Construction.....	2, 889. 14	
Maintenance.....	7. 50	
		<b>2, 896. 64</b>
<b>Irrigable lands: Farm-unit subdivision.....</b>		<b>1, 596. 11</b>
<b>Examination of project as a whole:</b>		
Preliminary surveys.....	35, 438. 15	
Hydrography.....	201. 64	
		<b>35, 639. 79</b>
<b>Administration of project as a whole: General expense.....</b>		<b>44, 082. 35</b>
<b>Inventory of unused supplies.....</b>		<b>14, 450. 54</b>
<b>Total building cost.....</b>		<b>475, 425. 09</b>
<b>Operation and maintenance:</b>		
Diversion system.....	3, 803. 20	
Buildings.....	99. 26	
Telephone system.....	168. 64	
		<b>4, 071. 10</b>
<b>Total building and operation and maintenance cost as per debit in cost of work in statement of assets and liabilities.....</b>		<b>479, 496. 19</b>

**PALOUSE PROJECT**

A general description of the Palouse project may be found in the third annual report.

Work on the project during the fiscal year has consisted mainly in gaging streams, and the total expenditures to June 30, 1909, amount to \$76 332.19.

**PRIEST RAPIDS PROJECT**

General descriptions of the Priest Rapids project may be found in the fourth and fifth annual reports.

Practically no work has been done on this project during the fiscal year.

The total expenditures to June 30, 1909, amount to \$6,466.01.

**YAKIMA PROJECT***GENERAL STATEMENT*

On March 31, 1909, the Secretary of the Interior approved an order consolidating all of the Reclamation Service projects in the Yakima valley under the name of the Yakima project.

The units comprising the Yakima project are as follows: Benton, Kittitas, Storage, Sunnyside, Tieton, and Wapato. Plans for the storage unit contemplate the general storage development of the Yakima drainage basin, and the other units will be dependent for full water supply on the storage unit. The Sunnyside, Storage, and Tieton units are under construction, preliminary surveys and estimates are in progress on the Kittitas unit and have been completed on the Wapato unit, and reconnaissance has been made of the Benton unit.

*BENTON UNIT*

A detailed description of the main features of the Benton unit is given in the fifth annual report in a discussion of Yakima district projects, and other statements relating to features of the unit appear in the fourth and sixth annual reports.

In brief, the plan for this unit contemplates the irrigation of approximately 150,000 acres of land in Benton County, Wash. The land lies along the west bank of Columbia River, about 120,000 acres being on the north and 30,000 acres on the south side of Yakima River.

*KITTITAS UNIT*

A detailed description of the main features of the Kittitas unit is given in the fifth annual report in a discussion of Yakima district projects, and other statements relating to features of the unit appear in the sixth annual report. In brief, the plan for Kittitas unit contemplates the irrigation of approximately 60,000 acres of land on both sides of Yakima River in the Kittitas basin, the lands being well adapted to diversified farming and to the cultivation of many varieties of fruit, particularly winter apples.

Investigations for the purpose of making estimates of cost and plans for development were begun about June 1, 1909, and will probably be completed before the end of the present year.

*STORAGE UNIT***WATER SUPPLY**

Source of water supply: Yakima River and its tributaries.

Area of drainage basin: 5,050 square miles.

Elevation of drainage basin: 2,000 to 6,000 feet above sea level.

Annual rainfall on drainage basin: 15 to 60 inches.

Average annual run-off of drainage basin: 3,300,000 acre-feet.

**ENGINEERING DATA FOR COMPLETE UNIT**

Reservoirs: Bumping Lake—area, 1,300 acres; capacity, 34,000 acre-feet; length of spillway, 235 feet; elevation of spillway, 40 feet above stream bed. Lake Clealum—area, 5,000 acres; capacity, 426,000 acre-feet; length of spillway, 407 feet; elevation of spillway, 130 feet above stream bed. Lake Kachess—area, 4,800 acres; capacity,

210,000 acre-feet; length of spillway, 282 feet; elevation of spillway, 63 feet above stream bed. Lake Keechelus—area, 2,600 acres; capacity, 142,000 acre-feet; length of spillway, 287 feet; elevation of spillway, 64 feet above stream bed. McAllister Meadows—area, 1,800 acres; capacity, 115,000 acre-feet; length of spillway, 250 feet; elevation of spillway, 150 feet above stream bed.

Storage dams: Bumping Lake—type, earth fill; maximum height, 50 feet; length of crest, 3,500 feet; contents, 206,000 cubic yards. Lake Clealum—type, earth fill; maximum height, 140 feet; length of crest, 1,200 feet; contents, 660,000 cubic yards. Lake Kachess—type, earth fill; maximum height, 73 feet; length of crest, 2,000 feet; contents, 220,000 cubic yards. Lake Keechelus—type, earth fill; maximum height, 64 feet; length of crest, 6,400 feet; contents, 480,000 cubic yards. McAllister Meadows—type, rock fill; maximum height, 160 feet; length of crest, 900 feet; contents, 450,000 cubic yards.

#### GENERAL STATEMENT

General descriptions of storage plans may be found in the third, fourth, and fifth annual reports. Earth-fill dams are contemplated at Bumping Lake and lakes Clealum, Kachess, and Keechelus, and a rock-fill dam at McAllister Meadows for the benefit of all projects in the Yakima basin. Temporary crib dams have been constructed at the outlets of lakes Clealum and Keechelus and a temporary crib dam at the outlet of Lake Kachess has been purchased. Construction is in progress at Bumping Lake dam, but none of the other contemplated features of the work have been commenced.

#### RESERVOIRS

The road from Naches to Bumping Lake, a distance of 46 miles, was completed by the Reclamation Service in the fall of 1908. Advertisement for proposals for the building of the dam was made twice, but no proposals were received, and authority was obtained for construction by force account. Accordingly supplies and equipment were hauled to the site during the winter of 1908-9 and construction was commenced as early as practicable in 1909. The late spring and an unexpected amount of seepage in the cut-off trench will very likely make it impossible to complete this work until 1910.

The work done in connection with Lake Clealum reservoir consists of the repair, maintenance, and operation of the temporary works, which impound about 23,000 acre-feet of water.

The work done in connection with Lake Kachess reservoir consists of the maintenance and operation of the temporary works, which impound about 19,000 acre-feet of water, and of investigations preliminary to the design of permanent works.

The work done in connection with Lake Keechelus reservoir consists of the repair, maintenance, and operation of the temporary works, which impound about 15,000 acre-feet of water.

The work done in connection with McAllister Meadows reservoir consists of investigations for the purpose of securing data for the design of storage works.

#### TELEPHONE LINES

For the purpose of obtaining quick communication for the release of stored water, telephone lines to each of the reservoirs now being operated or under construction have been built from the nearest point of connection with previously existing telephone and telegraph systems.

## TIMBER

The timber that would be submerged by raising the water in Bumping Lake and lakes Clealum, Kachess, and Keechelus was offered for sale, and proposals for its purchase were opened November 16, 1908. Contracts were awarded as follows, no proposals having been received for the timber around Bumping Lake:

*Contracts for sale of timber, storage unit*

No.	Date.	Contractor.	Feature.	Estimated value.	Payments to June 30, 1909.	Completion due.
270	Feb. 1, 1909	Flanagan Mining Co.	Lake Keechelus.....	\$82,159.34	.....	Feb. 1, 1919
276	Feb. 6, 1909	F. C. Westcott.....	Lake Kachess.....	15,310.91	.....	Feb. 6, 1919
277	Feb. 17, 1909	Jos. F. Walsh.....	Lake Clealum.....	40,434.78	\$1,000.00	Feb. 17, 1919

## SUNNYSIDE UNIT

## LOCATION AND CLIMATIC CONDITIONS

State: Washington.

Counties: Yakima and Benton.

Townships: 8 to 12 N., Rs. 19 to 25 E., Willamette meridian.

Railroad: Northern Pacific.

Railroad stations: Grandview, Sunnyside, Outlook, Granger, Mabton, and Byron, Wash.

Average elevation of irrigable area: 700 feet above sea level.

Average annual rainfall on irrigable area: 7 inches.

Range of temperature on irrigable area: -21° F. to 110° F.

## WATER SUPPLY

Source of water supply: Yakima River, supplemented by storage. (See storage unit.)

## ENGINEERING DATA FOR COMPLETE UNIT

Reservoirs and storage dams: See storage unit.

Diversion dam: Type, concrete ogee weir; maximum height, 8 feet; length, 500 feet.

Length of canals: 42 miles with capacities greater than 300 second-feet; 33 miles with capacities less than 300 and greater than 50 second-feet; 175 miles with capacities less than 50 second-feet.

Aggregate length of dikes: 1,600 feet.

Power development: 2,000 horsepower.

Construction of project authorized: December 12, 1905.

Per cent completed: 35.

## AGRICULTURAL CONDITIONS

Irrigable area: 98,600 acres.

Ownership of irrigable lands: Public, 4,700 acres; private, 93,900 acres.

Lands irrigated season of 1909: 45,200 acres.

Character of soil of irrigable area: Volcanic ash and gravel.

Duty of water: 3 acre-feet per acre per annum at the farm.

Principal products: Forage, hops, vegetables, and fruits.

Principal markets: Seattle, Tacoma, and Spokane, Wash.; eastern cities.

## LANDS OPENED FOR IRRIGATION

Dates of public notices: November 18, 1908; March 2, 1909.

Location of lands opened: Tps. 8 to 11 N., Rs. 20 to 25 E., Willamette meridian.

Irrigable area opened: Public, 1,085 acres; private, 14,646 acres.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: \$52.

Annual operation and maintenance charge: \$0.95 per acre of irrigable land.



## GENERAL STATEMENT

Descriptions of the Sunnyside unit of the Yakima project, given under the name of Sunnyside project, may be found in the fourth, fifth, sixth, and seventh annual reports. Briefly, the irrigation plan of this unit involves the construction of a diversion dam on Yakima River, near Parker, Wash., diverting water into the existing Sunnyside canal, covering lands north of Yakima River; the enlargement, improvement, and extension of this canal, both on the north and south sides of the river; and the development of power plants at various drops on the canal and laterals. The water supply for this unit depends on the flow of Yakima River, controlled by storage in lakes in the upper drainage area of this river (see storage unit). The diversion dam has been completed, the enlargement, improvement, and extension of the canal are in progress, and the power development remains to be undertaken.

## OFFICE BUILDINGS

An office building, now used as headquarters for the construction department, was completed early in the year and storehouses and machine shops were erected at a later date.

## MABTON DIVISION

The canal and pipe line of the Mabton division were constructed during the fiscal year substantially as described in the seventh annual report and in addition a distribution system for the first unit of about 2,600 acres was completed, the whole work, in a nearly completed condition, being turned over to the operating department in April.

The feeder canal was constructed by force account, an orange-peel excavator being used. This work was commenced November 14, 1908, and completed in February, 1909, except that a small amount of puddling was postponed until after water was turned into the canal.

The 54-inch concrete pipe for the pipe line was manufactured and placed, and the excavation and backfilling of the trench therefor was done by force account. Six hundred and twenty-four five-foot sections with the necessary collars for joining were made between July 15 and October 25, 1908. The sections of pipe were hauled to the trench by wagon.

The excavation and backfilling of the trench for wood-stave pipe, including the crossing of Yakima River, were done by force account, but the wood-stave pipe was supplied and laid by contract. Actual construction was commenced in September, 1908, and completed February 6, 1909, except that final backfilling of the trench was not completed until May 10, 1909. The river crossing was completed November 10, 1908.

The Mabton lateral was constructed under contracts awarded on the basis of proposals opened in October, 1908.

A telephone line extending from the intake at the main canal to the end of the Mabton lateral was completed and the blow-off valve and regulating works were installed, a small amount of work at the outlet of the blow-off pipe being still to be done.

## DISTRIBUTING SYSTEM

The sublateral systems under the Mabton and extension divisions comprising the first unit, with the exception of 6,800 feet of cement pipe line, were built by contract with the water users' association and paid for by cooperative certificates, \$21,836.86 in these certificates being issued therefor. Proposals for this work were opened by the water users' association November 7, 1908, and the work was completed in April, 1909.

Sand-cement pipe for use in the sublateral systems was manufactured and laid by force account, a pipe yard having been established at Granger, where gravel was available.

## CULVERTS AND TURNOUTS

During the period between November 1 and March 1, while there was no water in the main canal, nine concrete culverts, with openings ranging in size from  $2\frac{1}{2}$  by 3 feet to  $3\frac{1}{2}$  by 6 feet, were constructed. Eleven turnouts from the main canal were rebuilt, in eight of which 12-inch concrete pipe was used and in three of which 18-inch pipe was used. In addition to these, seven small turnouts were built by the operating department.

## SULPHUR CREEK WASTEWAY

A contract was executed August 15 for the excavation of the lower part of the Sulphur Creek wasteway and the installation of concrete drops therein. The contractors began the erection of machinery on the work in September and actual work was started in November. Fair progress was made on the excavation, but practically nothing was done on the drops.

Early in June the contractors abandoned the work, and the contract was suspended by the Director June 19. The work is being readvertised, and a new contract will be awarded if suitable proposals can be obtained.

The work of installing a wooden outlet drop for the wasteway has been completed by force account.

On account of the loose character of the soil through which the wasteway is being excavated it was found necessary to install cunettes. On June 30 about one-quarter of a mile of this work had been put in by force account, about 60,000 feet of lumber being used.

Plans have been completed for the intake and lined section at the upper end of the wasteway, and proposals were advertised for, to be opened July 30, 1909.

## MAIN CANAL ENLARGEMENT

A temporary enlargement of the main canal to provide for the Mabton division was completed early in March, part of this work being done with teams and scrapers and part with a Lidgerwood excavator. This excavator is now being used on the permanent enlargement, and a contract was let in March for a Bucyrus dredge, which will also be used in the permanent enlargement of the canal. The work of building a hull for the dredge was begun in June, and it is expected that the machinery will be installed and ready for operation in September.

## SURVEYS AND INVESTIGATION

Surveys for the enlargement of the main canal have been partially completed. Surveys and maps for right of way have been completed, and rights of way are now being secured.

Surveys and plans were made during the year for the irrigation of Prosser lands, and a report has been made thereon.

Observations of the movement of ground and drainage water have been carried on during the year, and these data are now being digested in connection with surveys and studies of a general drainage system.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal contracts, Sunnyside unit, Yakima project.*

No.	Date.	Contractor.	Feature.	Estimated value.	Estimated earnings June 30, 1909.	Completion due.
71	Oct. 25, 1905	Pacific Portland Cement Co.	Cement.....	\$7,000.00	\$5,311.85	
94	June 12, 1906	do.....	do.....	1,000.00	1,039.50	July 1, 1907
140	Oct. 15, 1906	do.....	do.....	1,000.00	1,062.37	June 1, 1908
244	July 8, 1908	Timothy Ryan.....	Wood-stave pipe....	66,702.10	66,189.34	Jan. 1, 1909
251	Aug. 15, 1908	H. K. Luce and Standard Building Co.	Sulphur Creek wasteway.	66,960.00	11,017.66	Do.
260	Oct. 28, 1908	David S. Wilson.....	Mabton main lateral, sections 2 and 3, excavation.	5,918.50	4,951.80	Feb. 15, 1909
261	Nov. 10, 1908	H. W. Holden.....	Mabton main lateral, section 1, excavation.	4,382.50	3,638.91	Do.
262	Nov. 28, 1908	George C. Clark.....	Flumes, Mabton main lateral.	5,040.00	5,476.67	Do.

<sup>a</sup> Suspended.

<sup>b</sup> Completed.

## PUBLIC NOTICE DATED NOVEMBER 18, 1908

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the Sunnyside project, Washington, under the provisions of the reclamation act, in the irrigation season of 1909, for the irrigable land shown on farm units of T. 8 N., R. 22 E.; T. 8 N., R. 23 E.; T. 9 N., R. 24 E.; T. 9 N., R. 25 E., Willamette meridian, approved November 12, 1908, by the Secretary of the Interior and on file in the local land office at North Yakima, Wash.

Homestead entries, accompanied by applications for water rights and the first installment of the building and operation and maintenance charges, may be made under the provisions of said act for the farm units shown on said plats. Water-right applications may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown upon the plats for the several farm units.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership which can be irrigated by the waters from the said irrigation project are in two parts as follows:

1. The building of the irrigation system, \$52 per acre of irrigable land, payable in not more than ten annual installments, each payment not less than \$5.20 per acre or some multiple thereof, provided, however, that full payment may be made at any

time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not. The operation and maintenance charge for the irrigation season of 1909 and until further notice will be 95 cents per acre of irrigable land, whether water is used thereon or not.

For lands hereafter entered the first installment on account of the said charges for the irrigable lands shown on these plats shall be paid for the season of 1909, at the local land office at North Yakima, Wash., at the time of entry and of filing water-right application, the total payment being not less than \$6.15 per acre. The second installment shall be due and payable March 1, 1910, at the same place. Subsequent installments shall be due and payable on March 1 of each year at the same place.

For lands in private ownership and for lands heretofore entered, the first installment shall be due and payable March 1, 1909, and the installments for the year 1910 and subsequent years shall be due and payable on the same date and at the same place.

The first installment of the charges for all irrigable areas shown on these plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable as herein provided.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid. Accordingly, no water will be furnished for the irrigation season of 1909 for any lands unless the portion of the installment for operation and maintenance due and payable on or before March 1, 1909, has been paid on or before that date, and in like manner no water will be furnished in any subsequent irrigation season unless payment has been made on or before March 1 of that year of the portion of the installment for operation and maintenance which was at that time due and payable.

For all applications for water rights filed after June 15 in 1909 or any subsequent year, one installment of the charge for building, operation and maintenance, \$6.15 per acre, must be paid at the time of filing, but the portion of the installment for operation and maintenance shall be credited on account of the installment of said charges for the subsequent year.

If any installment of the charges shall not have been paid in full on or before March 1 of the year subsequent to that in which it is due and payable as herein provided, it shall then become delinquent and under the terms of section 5 of the reclamation act the entry and water-right application shall be subject to cancellation with the forfeiture of any moneys paid thereon.

The charges herein provided for may for the convenience of applicants be paid to the special fiscal agent of the United States Reclamation Service assigned to the Sunnyside project for transmission to the registers and receivers of the local land offices on or before the date specified for payment at the local land offices, but in case this privilege is availed of, the necessary charges for transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

The notice was forwarded to the General Land Office for transmission to the local land office at North Yakima, Wash., with instructions for conforming to the farm units the homestead entries made or to be made under the provisions of the reclamation act; that the local officers give publicity to the notice and announce that water-right applications must be filed in the proper form in the local land office before water will be furnished; that the United States will maintain and operate the storage and diversion works and main canals as shown on a plat of the project approved by the Director of the Reclamation Service, a copy of which is on file with the engineer in charge of the project, the same to be subject to amendment and extension from time to time as may be found necessary; that the amount of water to be furnished is 3 acre-feet per acre per annum; that the building charge and number of annual installments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence in the neighborhood has been fixed at 50 miles; and that the Secretary of the Interior has entered

into a contract with the Sunnyside Water Users' Association, and the certificate of that association forming part of the water-right application must be filled in before the application can be accepted.

PUBLIC NOTICE DATED MARCH 2, 1909

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L., 388), notice is hereby given as follows:

Water will be furnished from the Sunnyside project, Washington, under the provisions of the reclamation act, for the irrigable land shown on the following township plats: T. 11 N., R. 20 E.; T. 11 N., R. 21 E.; T. 10 N., R. 21 E.; T. 10 N., R. 22 E.; T. 10 N., R. 23 E.; T. 9 N., R. 22 E.; T. 9 N., R. 23 E.; T. 8 N., R. 24 E.; T. 9 N., R. 24 E., Willamette meridian; approved March 2, 1909, by the Secretary of the Interior, and on file in the local land office at North Yakima, Wash.

Water will be furnished in the irrigation season of 1909 for that portion of the land shown upon a list on file in the local land office, the same having heretofore received water from the said Sunnyside project and now being in cultivation.

Water will be furnished for the remaining portions of the irrigable land shown on said plats, from time to time, as announcement shall be made that water is available.

Water-right applications may be made for the irrigable areas shown on the said plats. The time when payments will be due therefor is hereinafter stated.

The charges which shall be made per acre of irrigable land which can be irrigated by the waters from said irrigation project are in two parts, as follows:

1. The building of the irrigation system, \$52 per acre of irrigable land, payable in not more than ten annual installments, each payment not less than \$5.20 per acre or some multiple thereof, provided, however, that full payment may be made at any time of any balance remaining due, after certification has been made by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance, which will, as soon as the data are available, be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land whether water is used thereon or not. The operation and maintenance charge for the irrigation season of 1909, and until further notice, will be 95 cents per acre of irrigable land, for which water is ready in the irrigation season of 1909, whether water is used thereon or not.

The first installment on account of said charges for the irrigable lands shown on the list on file in the local land office to receive water in the irrigation season of 1909 shall be due March 15, 1909. The second installment shall be due March 1, 1910. Subsequent installments shall be due on March 1 of each year thereafter until fully paid. All charges are payable at the local land office, North Yakima, Wash.

The first installment of the charges for the irrigable land, for which water is to be subsequently furnished, will be due on March 1 of the year in which water shall be available for said lands, and subsequent installments shall be due on March 1 of each year thereafter until fully paid.

The first installment of charges for all lands shown on the said list, for which it is herein announced that water will be available in the season of 1909, whether or not water-right application is made therefor, or water is used thereon, shall be due and payable as herein provided.

The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges levied for that year shall have been paid in full. Accordingly no water will be furnished during the irrigation season of 1909 for any lands until the portion of the installment for operation and maintenance due on March 15, 1909, has been paid, and no water will be furnished in any subsequent irrigation season until the payment has been made of the portion of the installment for operation and maintenance due March 1 of said year.

Failure to make any two payments of the installments of charges when due shall render the application subject to cancellation, with forfeiture of all rights under the application, as well as of any moneys already paid thereon.

The charges herein provided for may, for the convenience of the applicants, be paid to the special fiscal agent of the United States Reclamation Service, assigned to the Sunnyside project, for transmission to the register and receiver of the local land office, provided the necessary charges for transportation of the cash, as determined by the special fiscal agent, accompany the payment of the water-right charges.

The notice was forwarded to the Commissioner of the General Land Office with instructions that publicity be given to the same, and that

the local officers be instructed to announce that water-right applications for the irrigable lands shown on the plats be properly executed and filed in the local land office before water can be furnished; that the water user shall receive the water at the main canal or some lateral thereof, and at his own expense convey the same to the land described in the water-right application; that the United States will maintain and operate the storage and diversion works and main canals, and the cost thereof shall be included in the operation and maintenance charges for the project; that the laterals and sublaterals constituting the balance of the distributing system are to be maintained and kept in serviceable condition by the water users to be served therefrom at their expense under regulations to be approved by the Secretary of the Interior; that the amount of water to be furnished, to be stated in the second paragraph of every application, is 3 acre-feet per acre per annum; that the building charge and number of annual installments are to be stated in the third paragraph of each application; that the limit of distance to be regarded as residence in the neighborhood has been fixed at 50 miles; and that the Secretary has entered into a contract with the Sunnyside Water Users' Association and the certificate of that association forming a part of the water-right application must be filled in before the application can be accepted.

#### SETTLEMENT AND DEVELOPMENT

During the past twelve months many new settlers have located in the Sunnyside unit, and an increased area of land has been irrigated.

The North Coast Railroad Company is now constructing a line through the unit, and the Northern Pacific is being extended through the upper portion, between the town of Granger and the intake of Sunnyside canal. These improvements will greatly facilitate settlement and development.

Lands, about 50 per cent of which will be watered this season, were opened for irrigation by the Secretary's announcement of November 18, 1908. They comprise 3,916 acres under the extension of the main canal below Prosser and 2,489 acres in the Mabton division, served by the Mabton pipe line. The Secretary's announcement of March 2, 1909, opened for irrigation the lands using rented water last year, a total of 5,467 acres. In addition to the above, 507 acres of new lands are being served with water this year on a rental basis. These lands comprise farms whose owners, assuming that they would receive water this season, had made arrangements therefor by planting young orchards and other permanent crops, all of which would have become a total loss without water this year.

Of 44,693 acres of old water-right lands, 27,468 acres have been subscribed for on government water-right contracts offered at the rate of \$10 per acre; payable in one or five installments.

#### IRRIGATION RESULTS

The crop returns at the end of the irrigation season of 1908 were extremely gratifying. From 42,300 acres of irrigated land crops were produced to the value of \$2,961,000, conservatively estimated, or an average of \$70 per acre.

The prospect for crops in the season of 1909 is good, with the exception of fruit. The yield of fruit will probably not be over 50 per

cent of the average, but it is expected that the small yield will be offset by higher prices. It is expected that the other crops will also bring higher prices than last season, and, in fact, alfalfa in the stack is commanding about \$3 more per ton than last season.

#### OPERATION AND MAINTENANCE

The main canal and its distributing system was successfully operated during the last half of the irrigation season of 1908 and the first half of the irrigation season of 1909, or between July 1 and November 1, 1908, and between April 1 and June 30, 1909, with the exception of a slight break in the main canal at mile 43 in July, 1908, caused by flood waters from a cloudburst entering the canal from the hills. The break was repaired within forty-eight hours of its occurrence, at a cost of \$288.

The following is a summary of the water service for the fiscal year, embracing parts of the irrigation season of 1908 and 1909:

	July 1- Oct. 1, 1908.	Apr. 1- June 30, 1909.	July 1, 1908- June 30, 1909.
Maximum flow at intake.....second-feet.....	660	659	660
Minimum flow at intake.....do.....	459	386	396
Average daily flow at intake.....do.....	569	589	
Total at intake.....acre-feet.....	138,634	106,185	244,819
Total delivered to land.....do.....			150,193
Average acreage served.....	43,000	45,200	44,100
Acre-feet per acre at intake.....	3.224	2.349	5.573
Acre-feet per acre delivered to the land.....	1.866	1.548	3.414

During the fiscal year the disbursements for operation and maintenance amounted to \$38,500, or \$0.87 per acre irrigated, while the receipts were \$85,546.32, or \$1.94 per acre irrigated.

The investigations for the purpose of determining seepage losses on six laterals, representative of the various soils and conditions encountered, begun early in the irrigation season of 1908, were continued during the latter part of that irrigation season, and the average seepage loss was found to be 16.7 per cent.

During the major portion of the year the operating department has carried on the work of installing measuring boxes and weirs, constructing new turn-outs in the main canal, necessary renewal of structures, rating of the main canal, locating and supervising the installation of pumping plants, determining and locating small power possibilities, making an operating and crop map of the entire district, and other similar work.

#### TIETON UNIT

##### LOCATION AND CLIMATIC CONDITIONS

State: Washington.

County: Yakima.

Townships: 12 to 15 N., Rs. 15 to 19 E., Willamette meridian.

Railroad: Northern Pacific.

Railroad stations: Yakima, North Yakima, and Naches, Wash.

Average elevation of irrigable area: 1,700 feet above sea level.

Average annual rainfall on irrigable area: 9 inches.

Range of temperature on irrigable area: - 21° F. to 102° F.

## WATER SUPPLY

Source of water supply: Tieton River.

Area of drainage basin: 243 square miles.

Average elevation of drainage basin: 4,000 feet above sea level.

Average annual rainfall on drainage basin: 48 inches.

Average annual run-off of drainage basin: 505,000 acre-feet.

## ENGINEERING DATA FOR COMPLETE UNIT

Diversion dam: Tieton River—type, concrete and rock-filled crib; maximum height, 3 feet; length of masonry, 110 feet; length of earth fill and rock fill, 320 feet.

Length of canals: 12 miles with capacities greater than 300 second feet; 34 miles with capacities less than 300 and greater than 50 second-feet; 340 miles with capacities less than 50 second-feet.

Aggregate length of tunnels: 11,000 feet.

Aggregate length of dikes: 1,150 feet.

Water power: Estimated total, 4,000 horsepower.

Construction of project authorized: December 12, 1905.

Per cent completed: 64.

## AGRICULTURAL CONDITIONS

Irrigable area: 32,400 acres.

Ownership of irrigable lands: Public, 2,200 acres; State, 2,290 acres; railroad, 710 acres; private, 27,200 acres.

Character of soil of irrigable area: Volcanic ash.

Principal products: Forage, hops, and fruit.

Principal markets: Seattle, Tacoma, and Spokane, Wash.; eastern cities.

## GENERAL STATEMENT

General descriptions of the Tieton unit are given in the fourth, fifth, sixth, and seventh annual reports, under the heading Tieton project. Briefly, the development of this unit is practically independent of the general Yakima project, the water therefor being diverted from Tieton River above the confluence with Naches River, a tributary of Yakima River. In order, however, to utilize the low flow for this unit it will be necessary to satisfy prior appropriators now diverting the said low flow of Tieton River through Naches and Yakima rivers by releasing stored water from Bumping Lake reservoir, which will be constructed for this purpose on Bumping River, a tributary of Naches River. The irrigation plan of the Tieton unit contemplates the construction of a diversion dam on Tieton River, a main canal heading at the diversion dam and located along the south side of Tieton canyon, and distributing canals and laterals for conducting water to bench lands west of the city of North Yakima. The diversion dam, the main canal, and the first unit of the distributing system are in progress of construction and will be completed during the calendar year 1909.

## OPEN CANAL EXCAVATION

The excavation of open canal by force account has been completed, and about 114,000 cubic yards of material were moved during the fiscal year. In order to understand this work, it should be borne in mind that it is located on a precipitous hillside containing varied classes of material, from loose top soil to solid rock, with many intermediate classes.



In keeping account of the cost of the work, no distribution was made between the several classes of excavation as defined in the specifications. In the table of costs given below, therefore, only the total actual cost and the average unit actual cost are shown. The total estimated cost given in the table is based on the actual quantities and the estimated unit prices.

*Estimated and actual cost of the canal excavation, Tieton unit*

Excavation.	Actual quantity.	Estimated cost.		Actual cost.	
		Total.	Unit.	Total.	Unit.
	<i>Cu. yds.</i>				
Class 1.....	35,052	\$8,763	\$0.25	.....	.....
Class 2.....	70,811	28,324	.40	.....	.....
Class 3.....	82,146	49,285	.60	.....	.....
Class 4.....	103,416	155,124	1.50	.....	.....
Total and average.....	291,421	241,496	.83	\$198,200	\$0.68

### TUNNEL EXCAVATION

About 2 miles out of a total of 12 miles of main canal are in 5 tunnels, ranging in length from 100 feet to 3,800 feet, the driving of all having been completed during the past year. Of these, Columnar Tunnel was driven by contract and the others by force account. Air and electric air drills were used. As in the open canal excavation, the excavated material was of various degrees of hardness, due to the fact that it is of volcanic origin. In Trail Creek tunnel the rock found was uniformly hard, dense basalt, but in Columnar tunnel the material was so soft that during a short breakdown of the power plant excavation was continued satisfactorily with pick and shovel. The principal data relating to these tunnels may be found in the table below.

*Excavation of tunnels, Tieton unit*

	Length.	Excavation.		Total cost.	Cost per linear foot.	Cost per cubic yard.
		Estimated.	Actual.			
	<i>Feet.</i>	<i>Cu. yds.</i>	<i>Cu. yds.</i>			
Steeple tunnels (2).....	103	285	342	\$1,663	\$16.15	\$4.85
Trail Creek tunnel.....	3,120	4,774	7,080	77,732	25.00	11.10
Columnar tunnel.....	1,183	1,596	2,415	16,866	14.26	7.00
Tieton tunnel.....	2,729	4,774	5,589	52,349	19.00	9.40
North Fork tunnel.....	3,811	8,601	11,700	70,888	18.60	6.10
Total and average.....	10,946	20,030	27,126	219,498	20.10	8.15

### CONCRETE LINING FOR CANAL AND TUNNELS

The work of manufacturing and placing concrete shapes for open canal and tunnel lining has been continued by force account during the fiscal year. On June 30, 1909, the manufacture of concrete shapes had been completed and the placing of shapes had been finished except for about 3 miles.

## WASTEWAYS

Five wasteways, controlled by floats along the canal, connected with the operating mechanism of the waste gates by electric circuits, have been planned, and two of them have been completed. The others will be constructed during 1909.

## DISTRIBUTION SYSTEM

Complete studies have been made of the distribution system, including location of laterals, surveys of irrigable lands, and division of the land into farm units. Construction is being confined to a unit of about 11,000 acres, which it is expected will be ready for flood water in 1910.

## PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

*Principal current contracts, Tieton unit, Yakima project*

No.	Date.	Contractor.	Feature.	Estimated value.	Estimated earnings June 30, 1909.	Completion due.
71	Oct. 25, 1905	Pacific Portland Cement Co.	Cement.....	\$15,000. 00	\$12,927. 00	
94	June 12, 1906	.....do.....	.....do.....	2,000. 00	2,260. 50	July 1, 1907
140	Oct. 15, 1906	.....do.....	.....do.....	35,000. 00	32,204. 38	June 1, 1908
271	Feb. 12, 1909	.....do.....	.....do.....	19,375. 00	2,227. 67	Dec. 31, 1909

## WAPATO UNIT

## LOCATION AND CLIMATIC CONDITIONS

State: Washington.

County: Yakima.

Townships: 10 and 12 N., Rs. 17 to 21, E. Willamette meridian.

Railroad: Northern Pacific.

Railroad stations: Alfalfa, Toppenish, Wapato, and Parker, Wash.

Average elevation of irrigable area: 850 feet above sea level.

Average annual rainfall on irrigable area: 7 inches.

Range of temperature on irrigable area: -21° F. to 110° F.

## WATER SUPPLY

Source of water supply: Yakima River, supplemented by storage. (See Storage unit.)

## ENGINEERING DATA FOR COMPLETE UNIT

Reservoirs and storage dams: See Storage unit.

Diversion dam: Type, concrete weir; maximum height, 8 feet; length of masonry, 500 feet.

Length of canals: 30 miles with capacities greater than 300 second-feet; 50 miles with capacities less than 300 and greater than 50 second-feet; 178 miles with capacities less than 50 second-feet; drainage trenches, 161 miles.

Aggregate length of dikes: 2,000 feet.

Water power: None developed; estimated total, 9,000 horsepower from drops in canals.

Construction of project authorized: June 16, 1906.

## AGRICULTURAL CONDITIONS

Irrigable area (whole project): 116,000 acres.

Ownership of irrigable lands (whole project): Indian.

Lands irrigated, season 1909: 15,000 from Indian canals.

Character of soil of irrigable area: Sandy loam underlaid with gravel and volcanic ash.

Principal products: Forage crops and fruits.

Principal markets: Seattle, Tacoma, and Spokane, Wash.; eastern cities.

## GENERAL STATEMENT

A detailed and general description of the Wapato unit may be found in the fifth, sixth, and seventh annual reports under the heading Wapato project. Briefly, the irrigation plan of this unit contemplates the utilization of an existing masonry diverting dam in Yakima River, constructed by the Reclamation Service for the Sunnyside project, and parts of the canal system constructed by the Office of Indian Affairs for the Yakima Indians, and the construction of such new canals and laterals as may be necessary, combined with a comprehensive drainage system where needed. The area that can be irrigated by gravity is approximately 100,000 acres, and about 16,000 acres more can be irrigated with pumped water, drops in the main canals being utilized to provide the necessary power.

## SURVEYS AND INVESTIGATIONS

Investigations for the purpose of making estimates of cost and plans for construction were commenced in November, 1908, and were practically completed June 30, 1909. Topographic maps on scales of 1,000 feet to 1 inch and 3,000 feet to 1 inch have been made, a canal and drainage system has been located, and preliminary sketches have been made of the most important structures thereon.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Yakima project*

ASSETS		
Accounts receivable:		
Uncollected freight refunds.....	\$3,644.97	
Uncollected water rentals.....	8,000.00	
		\$11,644.97
Inventories:		
Mercantile store.....	10,343.26	
Government animals.....	\$33,681.86	
Less depreciation.....	4,315.50	
		29,366.36
Equipment in use.....	137,599.54	
Less depreciation.....	20,114.67	
		117,484.87
Storehouse.....	33,975.99	
Cement.....	15,109.44	
Iron and steel.....	911.75	
Lumber.....	2,881.57	
Explosives.....	5,747.45	
Forage.....	11,726.35	
Fuel.....	709.13	
Cash in office safe.....	6,522.10	
Local products.....	8,183.97	
Unadjusted transfers.....	2,148.64	
Freight and handling, undistributed.....	34,991.80	
		280,112.58
Cost of work:		
Building cost.....	2,284,303.66	
Less adjustments.....	24,130.77	
Less accrued revenues.....	19,290.96	
		43,421.73
Operation and maintenance cost.....	130,720.55	
Less accrued revenues.....	148,224.87	
		a 17,504.32
Total assets.....		2,515,135.26

a This is a credit amount.

## LIABILITIES

<b>Investment of the United States:</b>			
Disbursement vouchers.....	\$2,193,220.03		
Transfer vouchers received.....	461,031.35		
		\$2,654,251.38	
Collection vouchers.....	233,325.60		
Transfer vouchers issued.....	120,601.45		
		353,927.05	
			\$2,300,324.33
<b>Accounts payable:</b>			
Unpaid labor.....	43,049.24		
Unpaid purchases.....	37,516.11		
Unpaid contract estimates.....	25,461.04		
Unpaid contract holdbacks.....	8,916.56		
Unpaid freight and express.....	20,542.19		
Unpaid passenger fares.....	412.13		
Unredeemed coupon books.....	799.35		
Unpaid miscellaneous.....	11,462.51		
			148,159.13
<b>Repayments accrued:</b>			
Building.....	63,080.19		
Operation and maintenance.....	3,571.61		
			66,651.80
<b>Total liabilities.....</b>			<b>2,515,135.26</b>

*Feature costs to June 30, 1909, Yakima project*

## SUNNYSIDE UNIT

<b>Diversion works: Dam and canal headworks.....</b>			<b>\$49,579.10</b>
<b>Canal system:</b>			
Purchase price.....	\$248,690.64		
Main canal.....	113,127.63		
Zillah wasteway.....	30,592.55		
Mabton pipe line.....	208,679.90		
Sulphur Creek wasteway.....	40,488.06		
Prosser extension to main canal.....	17,318.14		
Prosser pipe line.....	1,131.09		
Mabton wasteway (preliminary expense).....	202.63		
		660,230.64	
<b>Distributing system:</b>			
Mabton division.....	17,811.03		
Prosser extension to main canal.....	19,494.31		
		37,305.34	
<b>Pumping propositions:</b>			
Outlook pumping.....	1,015.85		
Euclid pumping.....	663.60		
		1,679.45	
<b>Buildings:</b>			
Office, warehouses, and machine shop.....	7,702.04		
Patrol house.....	1,157.62		
		8,859.66	
<b>Irrigable lands: Farm-unit subdivision and soil examination.....</b>			<b>1,382.62</b>
<b>Drainage investigations: Engineering.....</b>			<b>3,328.87</b>
<b>Preliminary examination of unit as a whole.....</b>			<b>47,190.69</b>
<b>Inventory of unused supplies.....</b>			<b>239.95</b>
<b>Telephone line: North Yakima to Sunnyside unit.....</b>			<b>927.11</b>
<b>Total building cost.....</b>			<b>810,723.43</b>
<b>Operation and maintenance:</b>			
Operation whole system.....	\$22,228.33		
Maintenance intake.....	887.77		
Maintenance main canal.....	26,052.80		
Maintenance laterals.....	13,897.66		
Maintenance wasteway and spillway.....	19.40		
Maintenance measuring boxes and weirs.....	14,529.47		
Maintenance telephone line.....	6,391.46		
Maintenance buildings.....	4,107.87		
General expense.....	42,537.23		
Inventory of unused supplies.....	68.56		
		130,720.55	
<b>Total cost of the unit.....</b>			<b>941,443.98</b>

TIETON UNIT

Bumping Lake reservoir:			
Dam site.....	\$23, 241. 82		
Real estate, lands submerged.....	5. 00		
General expense.....	11, 884. 53		
			\$35, 131. 35
McAllister Meadows: Survey dam site.....			8, 313. 83
Diversion system:			
Diversion dam.....	9, 164. 69		
Headworks.....	2, 720. 05		
			11, 884. 74
Tieton main canal:			
Earthwork, open canal.....	197, 449. 07		
Driving tunnel, and cost of power house, tramway, pipe and transmission line, construction and maintenance.....	224, 858. 60		
Manufacturing and placing open canal and tunnel shapes.....	141, 919. 23		
Other structures, masonry, sand box, spillways, safety appliances, etc.....	34, 462. 90		
			598, 689. 80
Tieton main canal—Schedules 6A and 7A:			
General expense.....	8, 041. 96		
Manufacturing shapes for canal and tunnels.....	92, 479. 99		
Laying and joining shapes for canal and tunnels....	63, 098. 42		
Plant for making tunnel sections and open canal shapes.....	17, 022. 98		
General machine shop and Naches warehouse.....	29, 937. 41		
Camp construction.....	2, 865. 56		
Camp maintenance.....	4, 462. 41		
Plant for laying tunnel and open canal shapes.....	14, 884. 46		
Extra work, including lining Trail Creek tunnel....	13, 060. 44		
			245, 853. 63
Distributing system:			
General expense, valley division.....	54, 757. 25		
Diversion dam, North Fork, No. 2.....	3, 501. 73		
Laterals.....	1, 437. 06		
			59, 696. 04
Storage for Kittitas, Benton, Sunnyside, and Wapato units (lakes Clealum, Keechelus, and Kachess):			
General expense.....	\$29, 233. 84		
Real estate, lands submerged.....	20, 996. 07		
Crib dam, construction and maintenance.....	89, 772. 26		
			140, 002. 17
Wagon roads and highways, construction and maintenance:			
Bumping Lake.....	46, 360. 82		
Tieton main canal.....	34, 243. 32		
Tieton Valley.....	1, 486. 60		
			82, 090. 74
Telephone system, construction and maintenance:			
Telephone line, Bumping Lake.....	4, 078. 99		
Telephone line, Tieton main canal.....	6, 678. 17		
Telephone line, Clealum, Keechelus, and Kachess.....	289. 57		
			11, 046. 73
Real estate (rights and property): Lands purchased for Tieton main canal.....			2, 760. 60
Buildings, construction and maintenance:			
Bumping Lake camp.....	\$11, 048. 86		
McAllister Meadow camp.....	765. 80		
Diversion dam.....	825. 72		
Tieton main canal and tunnel camps.....	30, 044. 16		
Patrol houses.....	5, 162. 78		
Distributing system camp.....	318. 58		
Storage camp (Clealum, etc.).....	285. 00		
			48, 450. 90

## WASHINGTON: YAKIMA PROJECT

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Reservoir reconnaissance.....		\$1,924.88
Administration of project as a whole:		
North Yakima, general expense.....	\$19,159.69	
General expense as a whole.....	152,593.18	
		171,752.87
Operating accounts.....		1,676.90
Inventory of unused supplies.....		9,558.61
		<hr/>
Total building cost.....		1,428,833.79

## WAPATO UNIT

Examination of project as a whole: Preliminary surveys.....	\$20,852.57
Real estate (rights and property): Legal expense.....	58.45
Administration of project as a whole: General expense.....	605.19
Preliminary investigations.....	4,618.09
	<hr/>
Total building cost.....	26,134.30

## KITITAS UNIT

Preliminary examination and surveys.....	\$7,444.69
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## BENTON UNIT

Preliminary examination and surveys.....	\$11,167.45
--	-------------

## RECAPITULATION BY UNITS

Building cost:		
Sunnyside.....	\$810,723.43	
Tieton.....	1,428,833.79	
Wapato.....	26,134.30	
Kittitas.....	7,444.69	
Benton.....	11,167.45	
	<hr/>	\$2,284,303.66
Operation and maintenance cost: Sunnyside.....		130,720.55
		<hr/>
Total building and operation and maintenance cost as per debit in cost of work in statement of assets and liabilities.....		2,415,024.21

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## WYOMING

### SHOSHONE PROJECT

#### LOCATION AND CLIMATIC CONDITIONS

State: Wyoming.

County: Big Horn.

Townships: 52 to 58 N., Rs. 97 to 105 W., sixth principal meridian.

Railroad: Chicago, Burlington and Quincy.

Railroad stations: Cody, Corbett, Ralston, Powell, Garland, Mantua, and Frannie, Wyo.

Average elevation of irrigable area: 4,500 feet above sea level.

Average annual rainfall on irrigable area: 8 inches.

Range of temperature on irrigable area: — 20° F. to 95° F.

#### WATER SUPPLY

Source of water supply: Shoshone River.

Area of drainage basin: 1,380 square miles.

Average annual rainfall on drainage basin: 15 inches.

Average annual run-off of drainage basin: 1,000,000 acre-feet.

#### ENGINEERING DATA FOR COMPLETE PROJECT

Reservoir: Shoshone—area, 6,600 acres; capacity, 456,000 acre-feet; length of spillway, 300 feet; elevation of spillway, 233 feet above stream bed.

Storage dam: Shoshone—type, rubble concrete arch; maximum height, 328½ feet; length of crest, 200 feet; contents, 75,000 cubic yards.

Diversion dams: Corbett—type, reinforced concrete weir; maximum height, 18 feet; length of masonry, 400 feet; length of earth fill, 440 feet. Eagle Nest—not designed.

Length of canals: 13 miles with capacities greater than 300 second-feet; 21 miles with capacities less than 300 and greater than 50 second-feet.

Aggregate length of tunnels: 19,000 feet.

Power development: Not determined.

Construction of project authorized: February 10, 1904.

Per cent completed: 45.

#### AGRICULTURAL CONDITIONS

Irrigable area: Whole project, 131,900 acres; first and second units, 31,000 acres.

Ownership of irrigable lands (whole project): Public, 123,000 acres; State, 7,680 acres; private, 1,220 acres.

Lands irrigated, season of 1909: Public, 10,000 acres.

Character of soil of irrigable area: Light sandy and clay loams.

Duty of water: 3 acre-feet per acre per annum at the farm,

Principal products: Hay, grain, and vegetables.

Principal markets: Local.

#### LANDS OPENED FOR IRRIGATION

Dates of public notices and orders relating thereto: November 25, 1907; April 3, 1908; and May 8, 1909.

Location of lands opened: Tps. 55 and 56 N., Rs. 98 to 100 W., sixth principal meridian.

Irrigable area opened: 31,000 acres.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: \$45 and \$46.

Annual operation and maintenance charge: \$1 per acre of irrigable land.

## GENERAL STATEMENT

A detailed description of the Shoshone project may be found in the fifth annual report and general descriptions of the project and of the progress of work thereon are given in other annual reports. Briefly, the irrigation plan of this project provides for a storage reservoir, controlled by Shoshone dam, on Shoshone River, about 8 miles above Cody, Wyo.; a high-line canal diverting water from Shoshone reservoir around the north end of Shoshone dam and covering lands in the vicinity of Cody, Corbett, Eagle Nest, and Ralston; a dam at Corbett, about 16 miles below the reservoir, diverting water on the north side of the river through the Corbett tunnel and the Garland canal to Ralston reservoir and thence through a distribution system to the lands in the vicinity of Ralston, Powell, Garland, Mantua, and Frannie; and a dam on Shoshone River near Eagle Nest, about 21 miles below the reservoir, diverting water through a tunnel on the south side of Shoshone River into a canal covering the lands of Shoshone River Valley. The Corbett diversion dam, the Corbett tunnel, and the greater part of the canal system controlled by it are completed. Shoshone dam and an extension of the canal system controlled by the Corbett dam are at present under construction, the other features of the project remaining for future construction.

## SHOSHONE DAM

The flood season of 1908 was of unusual length, and work in the river bed could not be resumed until August 28, 1908. The foundation pit was filled with mud and gravel, washed in by the floods, and a month was spent in removing this material before masonry work could be resumed. Satisfactory progress was made until work was suspended on account of severe winter weather, November 30, on which date the dam was 49 feet above the river bed.

Between March 16 and 29, 1909, the height of the dam was increased to 61 feet above the river bed and work was then suspended on account of spring floods. The month of June, 1909, was the first month in a record of seven years when the discharge of the river was more than enough to fill the reservoir, the total run-off for this month being 513,000 acre-feet, or nearly one-third more than greatest previously recorded monthly discharge. The total run-off for 1909 will probably be the greatest since records have been maintained. No damage resulted from the excessive floods.

The heavy rock excavation in the spillway and the waste tunnel was carried on during the summer of 1908 and the following winter. The tunnel was completed about March 1, 1909, and the construction of the concrete weir, 300 feet long, in April, 1909, completed the works comprising the overflow channel for Shoshone reservoir. Very satisfactory progress was made during the summer of 1908 in installing the high-pressure gates in the outlet tunnel. This important feature has been completed.

## SHOSHONE RESERVOIR HIGHWAY

Inasmuch as a number of miles of the Cody-Yellowstone Park road will be submerged, it has been necessary to construct a new road. This work has been done by force account during the past winter and



spring. The road is about 14 miles in length from the dam to the crossing of the river where connection is made with a 5-mile section of new county road, which connects with the road built by the Federal Government to the system of roads in Yellowstone Park. A section of the work three-fourths of a mile long was difficult rock and tunnel excavation, and was done by force account at less than half the lowest bid obtained.

With the exception of three steel bridges this highway was practically completed in June.

#### FRANNIE CANAL SYSTEM

A part of the Frannie canal system has been constructed to part-section and is being operated, and surveys for extensions are in progress.

#### PRINCIPAL CURRENT CONTRACTS

The following table contains data relating to the principal contracts in operation or completed during the fiscal year ending June 30, 1909:

##### *Principal contracts, Shoshone project*

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1909.	Completion due—
130	Sept. 10, 1906	U. S. Fidelity and Guaranty Co.	Shoshone dam.....	\$469,479.12	\$340,603.78	Nov. 1, 1909
139	Aug. 6, 1906	Billings Construction Co.	Corbett dam.....	66,750.00	a 71,591.85	Mar. 30, 1908
144	Nov. 2, 1906	Nels L. Olson.....	Garland canal, division 1.	270,746.00	a 293,812.51	Nov. 30, 1907
150	Feb. 14, 1907	New Jersey Foundry and Machine Co.	High-pressure gates.	55,500.00	a 55,720.53	Sept. 14, 1908
213	Nov. 20, 1907	Marquette Cement Manufacturing Co.	Cement.....	3,159.62	2,533.45	May 1, 1908
220	Mar. 3, 1908	do.....	do.....	11,400.00	12,974.19	
223	Mar. 16, 1908	United Kansas Portland Cement Co.	do.....	3,000.00	4,027.32	Oct. 1, 1908
230	Apr. 1, 1908	Portland Cement Co.	do.....	1,000.00	2,022.87	Do.
258	Oct. 1, 1908	Iola Portland Cement Co.	do.....	14,600.00	15,388.16	June 1, 1909
273	Feb. 25, 1909	do.....	do.....	24,717.60	4,084.00	Dec. 1, 1909
274	Feb. 27, 1909	Universal Portland Cement Co.	do.....	561.50	161.50	Do.

a Completed.

#### PUBLIC NOTICE DATED MAY 8, 1909

Pursuant to the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat. L. 388), notice is hereby given as follows:

Water will be furnished from the Shoshone project, Wyoming, under the provisions of the reclamation act in the irrigation season of 1909 for the irrigable lands in the second unit shown on farm-unit plats of Tps. 55 and 56 N., Rs. 98 and 99 W., sixth principal meridian, approved May 1, 1909, by the Secretary of the Interior and on file in the local land office at Lander, Wyo.

Homestead entries, accompanied by applications for water rights and the first installment of the water-right charges, may be made on and after May 22, 1909, beginning at 9 o'clock a.m., under the provisions of said act for the farm units shown on said plats. Water-right application may also be made for lands heretofore entered and for lands in private ownership, and the time when payments will be due therefor is hereinafter stated.

The register and receiver of the local land office at Lander, Wyo., will be present at Powell, Wyo., on the date of the opening and for five days thereafter, and will receive entries and water-right applications at that place.

Warning is hereby expressly given that no person will be permitted to gain or exercise any right whatever under any settlement or occupation begun prior to May 22, 1909, on any land which prior to this notice was subject to a withdrawal under the first form, and all such settlement or occupation is hereby forbidden.

The limit of area per entry, representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act, is fixed at the amounts shown on the plats for the several farm units.

The limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

The charges which shall be made per acre of irrigable land in the said entries and for lands heretofore entered or in private ownership are in two parts, as follows:

1. The building of the irrigation system, \$46 per acre of irrigable land, payable in not more than ten annual installments, each payment not less than \$4.60, or some multiple thereof, per acre. Full payment may be made at any time of any balance of the building charge remaining due, after certification by the Commissioner of the General Land Office that full and satisfactory compliance has been shown with all the requirements of the law as to residence, cultivation, and reclamation.

2. For operation and maintenance for the irrigation season of 1909 and annually thereafter until further notice, \$1 per acre of irrigable land, whether water is used thereon or not. As soon as the data are available, the operation and maintenance charge will be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land, whether water is used thereon or not.

All entries made hereafter for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by the first installment of the charges for building, operation, and maintenance, not less than \$5.60 per acre of irrigable land. The second installment shall become due on December 1 of the following year. Subsequent installments shall become due on December 1 of each year thereafter until fully paid.

For lands in private ownership, and for lands heretofore entered the first installment of the said charges shall become due on December 1, 1909. The second installment shall be due on December 1, 1910. Subsequent installments shall be due on December 1 of each year thereafter until fully paid.

Entries and water-right applications filed in 1910 and subsequent years must, in addition to one full installment of the charges, be accompanied by an amount equal to the portions of the installments of prior years for operation and maintenance which would have been payable had the entry and application been made in 1909.

The first installment of the charges for all irrigable areas shown on these plats, whether or not water-right application is made therefor or water is used thereon, shall be due and payable as herein provided.

The regulation is hereby established that no water will be furnished in any year until the portions for operation and maintenance of all installments then due shall have been paid. Accordingly no water will be furnished for the irrigation season of 1910 for any lands unless the portion for operation and maintenance of the installment due on or before December 1, 1909, has been paid, and in like manner no water will be furnished in any subsequent irrigation season until payment has been made of the portion of the installments for operation and maintenance beginning with the year 1909 then remaining due and unpaid.

Failure to pay any two installments of the charges when due, whether on entries made subject to the reclamation act, or on water-right application for other lands, shall render such entries and the corresponding water-right applications, if any, or the water-right applications for other lands, subject to cancellation, with the forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

All charges must be paid at the local land office at Lander, Wyo.

The charges may, for the convenience of applicants, be paid to the special fiscal agent of the United States Reclamation Service assigned to the Shoshone project, for transmission to the register and receiver of the local land office on or before the date specified for payment at the local land office; but in the case this privilege is availed of, the necessary charges for the transportation of the cash, as determined by the special fiscal agent, must accompany the payment of the water-right charges.

## SETTLEMENT AND DEVELOPMENT

On November 25, 1907, the first unit, comprising 15,237 acres, was opened to settlement. The second unit of 15,662 acres was opened May 8, 1909. This area of 30,899 acres includes 1,465 acres, in 22 farms, which are in private ownership, and 29,434 acres, in 473 farms, which is public land.

At the end of the fiscal year 11,360 acres, in 197 farms, had been filed upon, and approximately 10,000 acres had been irrigated. Substantial dwellings and farm buildings have been erected by a majority of the settlers. A few are planning to build their houses after harvesting their crops. Though there are but few experienced irrigators among the farmers, the crops, mainly oats, wheat, sugar beets, potatoes, and alfalfa, all give promise of good yields. Settlers continue to arrive and are filing on the additional lands as they become available. An expert irrigator renders all needed advice and instruction to the settlers in regard to the best means of managing their crops and water supply.

## OPERATION AND MAINTENANCE

There was remarkable freedom from difficulty in the operation of the new canal system during the first season of use, 1908. No serious breaks or leaks occurred after the first thorough priming of the canals. Water for the irrigating season of 1909 was turned into the main canal on May 5. Abundant water has been available for all needs of the crops and no serious troubles have occurred on the canal system.

## POWELL TOWNSITE

Sixteen blocks in Powell townsite were placed on sale on May 25, 1909. Twenty-six lots were sold at auction and four at private sale at their appraised value. Several business houses have been erected since the sale and others are in course of construction. A bank and the usual lines of staple business are represented, as well as the principal professions. A commercial club has been organized by the business men to promote the interests of the town. Schools and churches had been established before the opening of the town site and continue in a flourishing condition.

## FINANCIAL STATUS

*Assets and liabilities on June 30, 1909, Shoshone project*

ASSETS		
Accounts receivable:		
Uncollected water-right building charges.....	\$1,126. 11	
Uncollected water-right operation and maintenance charges.....	251. 13	
		\$1,377. 24
Inventories:		
Mercantile store.....		598. 37
Government animals.....	\$5,848. 99	
Less depreciation.....	703. 84	
		5,145. 15
Equipment in use.....	26,963. 68	
Less depreciation.....	2,953. 36	
		24,010. 32
Storehouse.....		4,847. 98
Cement.....		73,041. 15
Iron and steel.....		1,178. 92

## Inventories—Continued.

Lumber.....	\$10,778.72	
Forage.....	71.04	
Fuel.....	19.59	
Local products.....	1,833.25	
Unadjusted transfers.....	<sup>a</sup> 2,545.60	
Freight and handling undistributed.....	118.82	
		\$119,097.71

## Cost of work:

Building cost.....	3,062,939.84	
Plus adjustments.....	2,708.93	
		3,065,648.77
Less accrued revenues.....		4,825.13
		3,060,823.64
Operation and maintenance cost.....		19,486.14
Total assets.....		3,200,784.73

## LIABILITIES

## Investment of the United States:

Disbursement vouchers.....	\$3,069,672.38	
Transfer vouchers received.....	72,805.95	
		\$3,142,478.33
Collection vouchers.....	107,452.94	
Transfer vouchers issued.....	30,455.27	
		137,908.21
		\$3,004,570.12

## Accounts payable:

Unpaid labor.....	5,871.24	
Unpaid purchases.....	22,142.77	
Unpaid contract estimates.....	24,586.42	
Unpaid contract holdbacks.....	49,267.41	
Unpaid freight and express.....	40,333.15	
Unpaid passenger fares.....	21.15	
		142,222.14

## Repayments accrued:

Building.....	43,994.12	
Operation and maintenance.....	9,998.35	
		53,992.47
Total liabilities.....		3,200,784.73

*Feature costs to June 30, 1909, Shoshone project*

## Storage works:

Lands submerged by reservoir.....	\$107,940.44	
Shoshone dam and appurtenances.....	542,287.70	
Outlet tunnel and appurtenances.....	20,001.70	
Sluice gates.....	68,984.14	
		\$739,213.98

## High-line canal: Survey and examination.....

18,520.00

## Corbett diverting works:

Corbett dam.....	96,034.10	
Corbett tunnel.....	1,105,496.36	
Settling basin, dam, and spillway gatehouse, sluicing tunnel, addition to L-portal of sluicing tunnel.....	25,224.74	
		1,226,755.20

## Garland canal and laterals:

Survey and examination.....	1,687.23	
Earthwork.....	527,511.21	
Structures.....	198,785.90	
		727,984.34

## Frannie canal, extension and laterals: Survey and examination.....

1,924.94

## Willwood diverting system:

Diversion dam.....	225.00	
Tunnels.....	811.00	
		1,036.00
Willwood canal and laterals: Surveys and examination.....		8,213.00

## Wagon roads:

Highway (Shoshone reservoir).....	38,525.99	
Canyon road.....	51,632.41	
		90,158.40

## Telephone system:

Construction.....	1,441.61	
Maintenance.....	190.92	
		1,632.53

<sup>a</sup> This is a credit amount.

## Highway bridges:

Steel.....	\$5,900.87	
Wood.....	3,645.77	
Concrete pipe culverts.....	2,526.61	

---

\$12,073.25

Buildings: Construction.....32,205.29

Irrigable lands: Subdivision and soil examination.....2,660.97

Examination of project as a whole.....62,028.14

Administration of project as a whole: General expense.....136,646.12

Inventory of unused supplies.....1,887.68

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Total building cost.....3,062,939.84

## Operation and maintenance:

Operation Garland canal, divisions 1 to 19.....4,000.83

Maintenance Garland canal.....8,662.83

Corbett tunnel.....54.19

Highway bridges, concrete, steel, and wood.....6.51

Buildings.....62.27

Demonstration farm.....2,721.23

Administration charges.....3,978.28

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19,486.14Total building and operation and maintenance cost as per debit  
in cost of work in statement of assets and liabilities.....3,082,425.98

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